



Georgia Department of Transportation  
District 7

MSL-0004-00(427), MSL-0004-00(428), and NHS-0001-00(917)  
LEE ROAD/SWEETWATER ROAD WIDENING - PHASE 1, CR 817  
LEE ROAD WIDENING - PHASE 2  
I-20/LEE ROAD INTERCHANGE RECONSTRUCTION  
P. I. Nos. 0004427, 0004428, and 0001917  
Douglas County, Georgia

## Value Engineering Study Report Preliminary Design Phase

January 2007

*Design Team*

Carter & Burgess, Inc.  
The LPA Group  
Moreland Altobelli Associates, Inc.

*Value Engineering Consultant*



**Lewis & Zimmerman Associates, Inc.**



**Lewis & Zimmerman Associates, Inc.**

*Taking the Chance out of Change*

6110 Executive Boulevard, Suite 512  
Rockville, Maryland 20852-3903  
301-984-9590 • Fax: 301-984-1369  
info@lza.com • www.lza.com

January 25, 2007

Ms. Lisa L. Myers  
Design Review Engineer Manager  
State of Georgia Department of Transportation, General Office  
No. 2 Capitol Square, Room 266  
Atlanta, Georgia 30334-1002

Re: MSL-0004-00(427), P. I. No. 0004427, Lee Road/Sweetwater Road Widening – Phase 1  
MSL-0004-00(428), P. I. No. 0004428, CR 817/Lee Road Widening – Phase 2  
NHS-0001-00(917), P. I. No. 0001917, I-20/Lee Road Intersection Reconstruction  
Douglas County  
Value Engineering Study Report

Dear Ms. Myers:

Lewis & Zimmerman Associates, Inc. is pleased to submit four hard copies and one electronic copy of the referenced report.

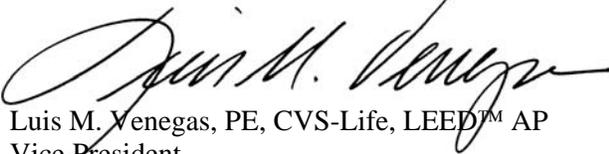
Although there are excellent opportunities for functional improvements to the projects, a number of the proposed alternatives have resulted in added costs. Notwithstanding, the developed alternatives provide valid, functional improvements with added value in terms of improved safety and traffic flow, and reduced congestion.

We thank you for your hospitality and for providing the information necessary for the VE team to generate creative, alternative solutions for these projects.

Please do not hesitate to call us should you have questions as you review this report and determine implementation.

Sincerely,

LEWIS & ZIMMERMAN ASSOCIATES, INC.



Luis M. Venegas, PE, CVS-Life, LEED™ AP  
Vice President

---

---

## TABLE OF CONTENTS

---

---

### EXECUTIVE SUMMARY

Introduction	2
Project Description	2
Concerns and Objectives	4
Highlights of the Study	4
Summary of Potential Cost Savings	7

### STUDY RESULTS

Introduction	10
Results of the Study	10
Evaluation of Alternatives	10
Value Engineering Alternatives	11

### PROJECT DESCRIPTION

Background	104
Lee Road/Sweetwater Road Widening, Phase 1	104
CR 817/Lee Road Widening, Phase 2	107
I-20/Lee Road Interchange Reconstruction	109
Construction Costs	110

### VALUE ANALYSIS AND CONCLUSIONS

General	113
Preparation Effort	113
Value Engineering Workshop Effort	113
Post-Workshop Effort	117
Value Engineering Workshop Agenda	118
Value Engineering Study Participants	120
Economic Data	123
Cost Estimate Summary and Cost Histograms	124
Function Analysis	126
Creative Idea Listing and Judgment of Ideas	130

---

---

## EXECUTIVE SUMMARY

---

---

### INTRODUCTION

This value engineering (VE) study report summarizes results of the VE study conducted by Lewis & Zimmerman Associates, Inc. (LZA) for the State of Georgia Department of Transportation (GDOT), Atlanta, Georgia. The subjects of the study were the following three projects: Lee Road/Sweetwater Road Widening – Phase 1; CR 817/Lee Road Widening – Phase 2; and I-20/Lee Road Interchange Reconstruction. These projects are known as: (1) MSL-0004-00(427), P. I. 000427; (2) MSL-000400(428), P. I. 0004428; and (3) NHS-0001-00(917), P. I. 0001917, respectively. All projects are in Douglas County, Georgia and are being designed by Carter & Burgess, Inc., The LPA Group, Inc., and Moreland Altobelli Associates, Inc., respectively.

### PROJECT DESCRIPTION

#### **U.S. Interstate Highway 20 (I-20)/Lee Road Interchange Reconstruction and Widening of Lee Road (NHS-0001-00(917), P. I. No. 0001917)**

This project involves the reconstruction of the Lee Road interchange over I-20 and the widening of Lee Road from 1,300 ft. south of I-20 to Vulcan Drive. The need exists to improve safety, operations and mobility for traffic in Douglas County to accommodate its growing population. This project will provide the additional capacity on Lee Road to accommodate the projected number of vehicles that are likely to use this roadway facility for travel to and from I-20 and to accommodate the widening of I-20 to provide barrier separated high occupancy vehicle (HOV) lanes. The I-20/Lee Road interchange in Douglas County serves as an arterial route for commuters to access I-20 from the suburban areas of Douglas County.

The proposed construction will widen Lee Road to provide two 12-ft. lanes in each direction divided by a 20-ft. raised grass median with 16-ft. shoulders that include curb and gutter and a 5-ft. sidewalk. An 8-ft. asphalt multi-use trail will be placed in the 16-ft. shoulder in lieu of the 5-ft. sidewalk along the east side of Lee Road. Seven lanes will be required across the proposed bridge (two northbound, two southbound, three left turn) with left-turn lanes separated by an 8-ft. raised concrete median. The ramps will be reconstructed/realigned and will vary in width to accommodate turning lanes at the ramp termini. The existing bridge on Lee Road over I-20 will be replaced with a new 380' x 115.33' bridge with horizontal clearances to accommodate the widening of I-20 to provide barrier separated HOV lanes. Traffic will be maintained via staged construction.

The probable cost of construction based on Moreland Altobelli Associates, Inc.'s cost estimate dated August 8, 2006 is \$47,266,995. This figure is comprised of: (1) Construction Subtotal at \$14,257,008, (2) Engineering and Construction (10.00%) at \$1,425,701, (3), Inflation (15.76% based on 5.00% per annum for three years) at \$2,471,987, (4) Construction Total at \$18,154,987, (5) Right-of-way costs at \$28,762,299, and (6) Reimbursable Utilities at \$350,000.

### **Lee Road/Sweetwater Road Widening – Phase 1 (MSL-0004-00(427), P. I. No. 0004427)**

This project is the widening and reconstruction of Lee Road/Sweetwater Road which will begin at the intersection of Lee Road and Vulcan Drive just north of I-20 and extend north to the intersection of South Sweetwater Road and U.S. Route (US) 78/State Route (SR) 5/SR 8/Bankhead Highway. Lee Road and South Sweetwater Road within the project limits are currently two lanes and are classified as urban minor arterials. The need exists to improve safety, operations, and mobility for local and through traffic in Douglas County to accommodate its growing population. Widening Lee Road and South Sweetwater Road will facilitate a better connection from I-20 and Bankhead Highway corridor by improving the north-south movement.

The proposed construction will provide four 12-ft. lanes with 16-ft. urban shoulders (consisting of concrete curb and gutters and sidewalks) and a 20-ft. raised median from Vulcan Drive to Skyview Drive. One side of the road will have a multi-use trail on the shoulder. Because of right-of-way and environmental constraints, two 11-ft. lanes with 16-ft. shoulders and one 11-ft. two-way left turn lane will be provided from Skyview Drive to Bankhead Highway. One side of the road will have a multi-use trail on the shoulder. A realignment of Lee Road/South Sweetwater Road is proposed where Lee Road currently joins Sweetwater Road at a “T” intersection. Temporary lane closures and on-site detours may be required during construction.

The probable cost of construction based on Carter & Burgess, Inc.’s undated cost estimate is \$15,294,393. This figure is comprised of: (1) Construction Subtotal at \$8,110,800, (2) Engineering and Construction (10.00%) at \$811,080, (3), Inflation (10.25% based on 5.00% per annum for two years) at \$914,493, (4) Construction Total at \$9,836,393, (5) Right-of-way costs at \$4,858,000, and (6) Reimbursable Utilities at \$600,000.

### **County Road (CR) 817/Lee Road Widening – Phase 2 (MSL-0004-00(428), P. I. No. 0004428)**

This project involves the widening and reconstruction of CR 817/Lee Road which will begin at SR 92/Fairburn Road to 1,100 ft. south of the existing eastbound entrance and exit ramps at I-20. CR 817/Lee Road within the project limits is currently two lanes and classified as an urban minor arterial. The need exists to improve safety, operations, and mobility for local and through traffic in Douglas County to accommodate its growing population. Widening CR 817/Lee Road will facilitate a better connection from SR 92 to I-20 by improving the north-south movement.

The proposed construction will provide a four-lane urban roadway divided by a 20-ft. raised grassed median. The existing 5-ft. grassed shoulders will be replaced with 16-ft. shoulders with curb and gutter and 5-ft. sidewalks. An 8-ft. asphalt multi-use trail will be placed within the 16-ft. shoulder along the east side of Lee Road from East County Line Road to the end of the project to accommodate Douglas County’s Bicycle Pedestrian Plan. The existing traffic signal at SR 92/Fairburn Road will be upgraded to provide protected left turning movements. Temporary lane closures and on-site detours may be required during construction.

The probable cost of construction based on The LPA Group, Inc.’s cost estimate dated December 20, 2006 is \$18,086,336. This figure is comprised of: (1) Construction Subtotal at \$12,027,488, (2) Engineering and Construction (10.00%) at \$1,202,749, (3), Inflation (10.25% based on 5.00% per annum for two years) at \$1,356,099, (4) Construction Total at \$14,586,336, and (5) Right-of-way costs at \$3,500,000.

## CONCERNS AND OBJECTIVES

The Project Concept Reports indicate these projects are to be let within a relatively short time of each other starting in 2007 through 2008, and that all have an approximate completion time of three years, i.e., 2010 to 2011. Furthermore, the projects are at the preliminary stage of design and three independent design consultants are involved. However, it would have been expected to have the three cost estimates' unit prices to be within a reasonable percentage of each other. This has not been the case as noted on the table below:

### UNIT PRICE COMPARISON

Construction Item	Lee Road – Ph 1	Lee Road - Ph 2	I-20 / Lee Road IC
Gravel Aggregate Base (12")	\$25.00 / Ton	\$15.00 / Ton	\$20.00 / Ton
Asphalt Surface (1.5")	\$100.00 / Ton	\$92.00 / Ton	\$75.00 / Ton
Asphalt Binder (2.0")	\$100.00 / Ton	\$92.00 / Ton	\$75.00 / Ton
Asphalt Base (4.0")	\$100.00 / Ton	\$92.00 / Ton	\$75.00 / Ton
<i>Asphalt Pavement Converted to a SY Cost</i>	<i>\$59.07 / SY</i>	<i>\$48.95 / SY</i>	<i>\$45.15 / SY</i>
Concrete Sidewalk (4")	\$60.00 / SY	\$55.00 / SY	\$26.41 / SY
<i>Asphalt Multi-Use Trail Converted to a LF Cost</i>	<i>\$26.16 / LF</i>	<i>\$24.60 / LF</i>	<i>\$23.47 / LF</i>
Concrete Median	\$80.00 / SY	\$70.00 / SY	\$34.05 / SY (Avg)
Escalation (5.00% / year)	2-years at 10.25%	2-years at 10.25%	3-years at 15.76%

Although each projects' value engineering alternatives were priced at their respective unit prices, a comparison between projects or totals could not be achieved. Additionally, the Department may find it difficult to make comparisons at this early stage of design, leading to misinterpretations of the costing data and "bottom lines."

A second concern was the number of intersections along the Lee Road/Sweetwater Road widened corridor since some of the major components of the projects are stated to be increased capacity, alleviation of congestion and improving traffic flow. The numerous "right-in/right-out only" intersections defeat some of these goals as drivers will jump into on-coming traffic in an attempt to move over to the closest median opening to make a legal (or illegal) U-turn.

As such, the objective of the effort was to identify opportunities that would improve the value of the project in terms of fulfilling the basic functions of alleviating congestion, increasing capacity and improving traffic flow while ultimately reducing capital cost where possible and warranted.

## HIGHLIGHTS OF THE STUDY

Listed below are some of the ideas developed.

As noted above, the many "right-in/right-out only" intersections needed to be addressed in terms of improving safety as drivers have a penchant to ignore cautious, safe vehicular movements merely to make a U-turn as soon as possible. This, in turn, slows down traffic, reduces traffic flow, and ultimately recreates the exact congestion the projects are to improve. As such, Alt. Nos. PH1-2, PH1-7, PH1-8, PH1-9, PH2-10, PH2-12, and IR-1 all cul-de-sac the following corresponding streets: Linda Drive, Cooper Circle, Inman Street, Houston Street, Maxwell Place, Park Avenue, and Sweetwater Industrial Boulevard. Alt. Nos. PH1-2, PH1-7, PH1-8, PH1-9 all increase the initial cost of the projects by a cost of almost \$51,000, while PH2-10, PH2-12,

and IR-1 cumulatively decrease the projects initial cost by almost \$225,000, thus netting a savings of nearly \$174,000.

In looking at other areas of opportunity to improve safety along the proposed widened corridor, several alternatives were developed. Eliminating the proposed new connection between Old Chestnut Log Road and Lee Road would eliminate an intersection on a curve that already has limited visibility to crossing and entering traffic. This is noted in Alt. No. PH2-4 that would allow local traffic to use Chestnut Log Loop for access to Lee Road at that existing intersection and to travel to other destinations thus realizing initial savings approaching \$150,000. Alt. No. PH2-6 extends the proposed right-turn lane from the entrance to Sweetwater Elementary School to East County Line Road. Although increasing the initial cost by about \$31,000, the safety of children and the school buses they ride is paramount. In a similar manner, Alt. No. PH2-9 realigns the Marvelous Light Christian Ministries' property driveway to be part of the Lee Road/South County Line Road intersection. Again, although increasing the initial cost by almost \$27,000, it provides a safer ingress/egress situation at the church. Keeping with the safety theme, if access to the Brodick Hill Apartments is provided from Vulcan Drive, the residents of these apartments can safely access Lee Road and Sweetwater Industrial Boulevard as shown on Alt. No. IR-9; however, it increases the cost of the project by nearly \$270,000 of which about \$200,000 is for new right-of-way purchases.

Present worth life cycle cost savings of close to \$117,000 can be attained if concrete pavement is extended from the eastbound I-20 lanes to Monier Boulevard as noted on Alt. No. IR-6. Initially adding about \$80,000, an additional \$199,000 over a 35-year period can be saved due to the improved maintenance associated with concrete vs. asphalt paving for this application.

Three alternatives address the issue of the multi-use trail and its conversion to sidewalks. Although acknowledging some loss in recreational value to convert to sidewalks, they do become more pedestrian safe and friendly. These alternatives are PH1-6, PH2- 2 and IR-4. In Alt. No. PH1-1, the initial cost increase of about \$84,000 is offset by a life cycle cost savings of nearly \$300,000, netting a savings over 35 years of about \$218,000. In a similar manner, Alt. No. PH2-2 increases initial cost by close to \$38,000 but coupled with a life cycle cost savings noted to be about \$150,000, a net savings over a 35-year period is nearly \$115,000. Finally, Alt. No. IR-4 actually saves about \$94,000, as the width of the bridge can be reduced and still add approximately \$66,000 in life cycle savings leading to present worth cost savings of nearly \$160,000.

Alt. No. PH1-1 provides access to Groovers Lake Road adjacent to the new Lee Road/Groovers Lake Road/Linda Drive intersection for the new fire station. Although adding about \$90,000 to the project, this access is required to assure easy accessibility of emergency equipment to Lee Road and the serving community.

Two added-value alternatives should be explored by the Department and local communities: (1) Alt. No. PH2-3 would extend the multi-use trail to serve the Sweetwater Creek Recreational Area and State Park along Cedar Terrace Road from Lee Road. Although the costs are significant, the original intent was to have a recreational, multi-use trail connect Lee Road with the State Park; and (2) Alt. No. IR-2 would adjust the proposed median to allow left turns, i.e., southbound movements from Monier Boulevard to Lee Road. In addition to improving traffic flow and minimizing queuing and tie-ups, drivers expect to be able to make a southbound turn from Monier Boulevard, which is not permitted in the current design. Although a slight increase in initial cost of about \$4,300 is incurred, the benefits outweigh the increase.

Normally not addressed as an alternative, cost estimate corrections are usually brought up during the informal oral presentation or discussion during the course of the week's workshop. This is done in an effort to alert the Department and the design teams of discrepancies warranting correction or further investigation. Alt. No. IR-8 addresses an estimate correction that requires further scrutiny as the magnitude of the added cost for the

proposed new Lee Road Bridge over I-20 is significant and could lead to other project adjustments or re-design of the bridge. As noted in the alternative, the provided cost per square ft. for the concrete bridge was noted to be \$65.00. In accordance with the Department's Bridge and Structures Policy Manual, a bridge of this nature should be priced in the vicinity of per \$90.00 square ft.. As such, the increase in cost to the project is over \$1,400,000.

The Summary of Potential Cost Savings worksheet following this narrative outlines all of the alternatives and design suggestions developed by the VE team. Some of the alternatives are mutually exclusive or interrelated so that addition of all project cost savings does not equal total savings for the project. A full listing of all of the ideas considered by the VE team can be found in the Creative Idea Listing worksheets in the Value Analysis and Conclusions section of this report.



# SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: MSL-0004-00(427) **LEE/SWEETWATER ROADS WIDENING PHASE 1**  
 MSL-0004-00(428) **CR 817/LEE ROAD WIDENING PHASE 2**  
 NHS-0001-00(917) **I-20/LEE ROAD INTERCHANGE RECONSTRUCTION**  
**Douglas County, Georgia Department of Transportation, District 7**  
*Preliminary Design Stage*

PRESENT WORTH OF COST SAVINGS

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
	<b>PHASE 1 (PH1) Lee Road/Sweetwater Road Widening</b>					
PH1-1	Provide access to the new fire station at the intersection of Groovers Lake Road and Linda Drive	\$0	\$90,127	(\$90,127)		(\$90,127)
PH1-2	Eliminate the Linda Drive/South Sweetwater Road intersection and designate Linda Drive a cul-de-sac	\$27,600	\$36,746	(\$9,146)		(\$9,146)
PH1-6	Replace the multi-use trail on the east side of Lee Road with a sidewalk	\$693,717	\$777,327	(\$83,610)	\$301,341	\$217,731
PH1-7	Eliminate the Cooper Circle/South Sweetwater Road intersection and designate Cooper Circle a cul-de-sac	\$28,746	\$38,169	(\$9,423)		(\$9,423)
PH1-8	Eliminate the Inman Street/South Sweetwater Road intersection and designate Inman Street a cul-de-sac	\$14,705	\$36,094	(\$21,389)		(\$21,389)
PH1-9	Eliminate the Houston Street/South Sweetwater Road intersection and designate Houston Street a cul-de-sac	\$26,239	\$38,226	(\$11,987)		(\$11,987)
	<b>PHASE 2 (PH2) CR 817/Lee Road Widening</b>					
PH2-2	Replace the multi-use trail on the east side of Lee Road with a sidewalk	\$354,560	\$392,870	(\$38,310)	\$153,394	\$115,084
PH2-3	Extend the multi-use trail to serve the Sweetwater Creek Recreational area and State Park along Cedar Terrace Road	\$0	\$186,036	(\$186,036)		(\$186,036)
PH2-4	Eliminate the new connection between Old Chestnut Log Road and Lee Road	\$237,493	\$87,928	\$149,565		\$149,565
PH2-6	Extend the school bus turning lane between the Sweetwater Elementary School entrance and East County Line Road on Lee Road	\$0	\$30,866	(\$30,866)		(\$30,866)
PH2-9	Realign the driveway to the Marvelous Light Christian Ministries property	\$0	\$27,397	(\$27,397)		(\$27,397)
PH2-10	Eliminate the Maxwell Place/Lee Road intersection and designate Maxwell Place a cul-de-sac	\$121,131	\$24,111	\$97,020		\$97,020



# SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: MSL-0004-00(427) LEE/SWEETWATER ROADS WIDENING PHASE 1  
 MSL-0004-00(428) CR 817/LEE ROAD WIDENING PHASE 2  
 NHS-0001-00(917) I-20/LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

PRESENT WORTH OF COST SAVINGS

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
PH2-11	Do not construct the "New Road"	\$174,087	\$0	\$174,087		\$174,087
	<b>PHASE 2 (PH2) CR 817/Lee Road Widening</b>					
PH2-12	Eliminate the Park Avenue/Lee Road intersection, extend Madison Place to the "New Road," and designate Park Avenue a cul-de-sac	\$64,655	\$35,160	\$29,495		\$29,495
	<b>Interchange Reconstruction (IR)</b>					
IR-1	Cul-de-sac Sweetwater Industrial Drive/Lee Road intersection	\$109,155	\$10,648	\$98,507		\$98,507
IR-2	Allow westbound Monier Boulevard traffic to turn southbound onto Lee Road	\$6,259	\$10,539	(\$4,280)		(\$4,280)
IR-4	Replace the multi-use trail on the east side of Lee Road with a sidewalk	\$615,169	\$521,345	\$93,824	\$66,317	\$160,141
IR-6	Extend the concrete pavement to Monier Boulevard	\$220,375	\$300,667	(\$80,292)	\$197,856	\$117,564
IR-7	Eliminate the sidewalks on the bridge and provide a multi-use trail	\$615,169	\$706,988	(\$91,819)		(\$91,819)
IR-8	Adjust the cost estimate to more accurately reflect the cost of the new bridge	\$3,650,201	\$5,054,125	(\$1,403,924)		(\$1,403,924)
IR-9	Provide access to Brodick Hill Apartments from Vulcan Drive	\$0	\$269,542	(\$269,542)		(\$269,542)

---

---

## **STUDY RESULTS**

---

---

### **INTRODUCTION**

The results are the major feature of a value engineering study since they represent the benefits that can be realized on the project. The results will directly affect the project design and will require coordination among GDOT, the design team and the users to determine the ultimate acceptance of each alternative.

### **RESULTS OF THE STUDY**

The VE team generated 33 ideas for improvement during the Function Analysis and Creative Ideas phases of the VE Job Plan. The evaluation of these ideas was based upon their potential for capital cost savings, probability of acceptance, availability of information to properly develop an idea, compliance with perceived quality, adherence to universally accepted standards and procedures, life cycle cost efficiency, safety, maintainability, constructability and soundness of the idea.

Of the 33 ideas generated, 23 were sufficiently rated to warrant further investigation. Continued research and development of these ideas yielded 21 alternatives for change with an impact on project costs. All of these alternatives and design suggestions are presented in detail following this narrative and on the Summary of Potential Cost Savings worksheets.

### **EVALUATION OF ALTERNATIVES**

It is important to consider each part of an individual alternative on its own merit. There may be a tendency to disregard an alternative because of concern about one portion of it. Separate consideration should be given to each of the areas within an alternative that are acceptable, and those parts should be considered in the final design, even if the entire alternative is not implemented.

Cost is the primary basis of comparison for alternative designs. To ensure that costs are comparable within the alternatives proposed by the VE team, the designer's cost estimates, where possible, are used as the pricing basis. Where appropriate, the impact of energy costs, replacement costs, and effect on operations and maintenance are shown within each alternative.

Some of the alternatives are interrelated, so acceptance of one may preclude the acceptance of another. The reader should evaluate those alternatives carefully to select the ideas with the greatest beneficial impact to the project.



# SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: MSL-0004-00(427) **LEE/SWEETWATER ROADS WIDENING PHASE 1**  
 MSL-0004-00(428) **CR 817/LEE ROAD WIDENING PHASE 2**  
 NHS-0001-00(917) **I-20/LEE ROAD INTERCHANGE RECONSTRUCTION**  
**Douglas County, Georgia Department of Transportation, District 7**  
*Preliminary Design Stage*

PRESENT WORTH OF COST SAVINGS

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
	<b>PHASE 1 (PH1) Lee Road/Sweetwater Road Widening</b>					
PH1-1	Provide access to the new fire station at the intersection of Groovers Lake Road and Linda Drive	\$0	\$90,127	(\$90,127)		(\$90,127)
PH1-2	Eliminate the Linda Drive/South Sweetwater Road intersection and designate Linda Drive a cul-de-sac	\$27,600	\$36,746	(\$9,146)		(\$9,146)
PH1-6	Replace the multi-use trail on the east side of Lee Road with a sidewalk	\$693,717	\$777,327	(\$83,610)	\$301,341	\$217,731
PH1-7	Eliminate the Cooper Circle/South Sweetwater Road intersection and designate Cooper Circle a cul-de-sac	\$28,746	\$38,169	(\$9,423)		(\$9,423)
PH1-8	Eliminate the Inman Street/South Sweetwater Road intersection and designate Inman Street a cul-de-sac	\$14,705	\$36,094	(\$21,389)		(\$21,389)
PH1-9	Eliminate the Houston Street/South Sweetwater Road intersection and designate Houston Street a cul-de-sac	\$26,239	\$38,226	(\$11,987)		(\$11,987)
	<b>PHASE 2 (PH2) CR 817/Lee Road Widening</b>					
PH2-2	Replace the multi-use trail on the east side of Lee Road with a sidewalk	\$354,560	\$392,870	(\$38,310)	\$153,394	\$115,084
PH2-3	Extend the multi-use trail to serve the Sweetwater Creek Recreational area and State Park along Cedar Terrace Road	\$0	\$186,036	(\$186,036)		(\$186,036)
PH2-4	Eliminate the new connection between Old Chestnut Log Road and Lee Road	\$237,493	\$87,928	\$149,565		\$149,565
PH2-6	Extend the school bus turning lane between the Sweetwater Elementary School entrance and East County Line Road on Lee Road	\$0	\$30,866	(\$30,866)		(\$30,866)
PH2-9	Realign the driveway to the Marvelous Light Christian Ministries property	\$0	\$27,397	(\$27,397)		(\$27,397)
PH2-10	Eliminate the Maxwell Place/Lee Road intersection and designate Maxwell Place a cul-de-sac	\$121,131	\$24,111	\$97,020		\$97,020

# VALUE ENGINEERING ALTERNATIVE



PROJECT: MSL-0004-00(427) **LEE/SWEETWATER ROADS WIDENING PHASE 1**  
 MSL-0004-00(428) **CR 817/LEE ROAD WIDENING PHASE 2**  
 NHS-0001-00(917) **I-20/LEE ROAD INTERCHANGE RECONSTRUCTION**  
**Douglas County, Georgia Department of Transportation, District 7**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**PH1-1**

DESCRIPTION: **PROVIDE ACCESS TO THE NEW FIRE STATION AT THE  
 INTERSECTION OF GROOVERS LAKE ROAD AND LINDA DRIVE**

SHEET NO.: **1 of 5**

**ORIGINAL DESIGN:** (Sketch attached)

The original design realigns Groovers Lake Road but does not accommodate access to the new, as yet un-commissioned fire station at the corner of Groovers Lake Road and Linda Drive.

**ALTERNATIVE:** (Sketch attached)

Provide access to the new fire station onto Groovers Lake Road adjacent to the new Lee Road/Groovers Lake Road/Linda Drive intersection.

**ADVANTAGES:**

- Provides required access
- Improves emergency response time

**DISADVANTAGES:**

- Increases initial cost
- May require the use of a single-use traffic control device

**DISCUSSION:**

The new fire station was recently constructed and has not yet been commissioned. When the current design documents were produced, the required access had not been incorporated into the design. Although increasing the initial cost of the project, the overall benefits associated with rapid emergency vehicle responses outweigh the added costs.

Due to the location of the proposed emergency intersection, a traffic control device may be required and has been included in the costs below.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 0	—	\$ 0
ALTERNATIVE	\$ 90,127	—	\$ 90,127
SAVINGS	\$ (90,127)	—	\$ (90,127)

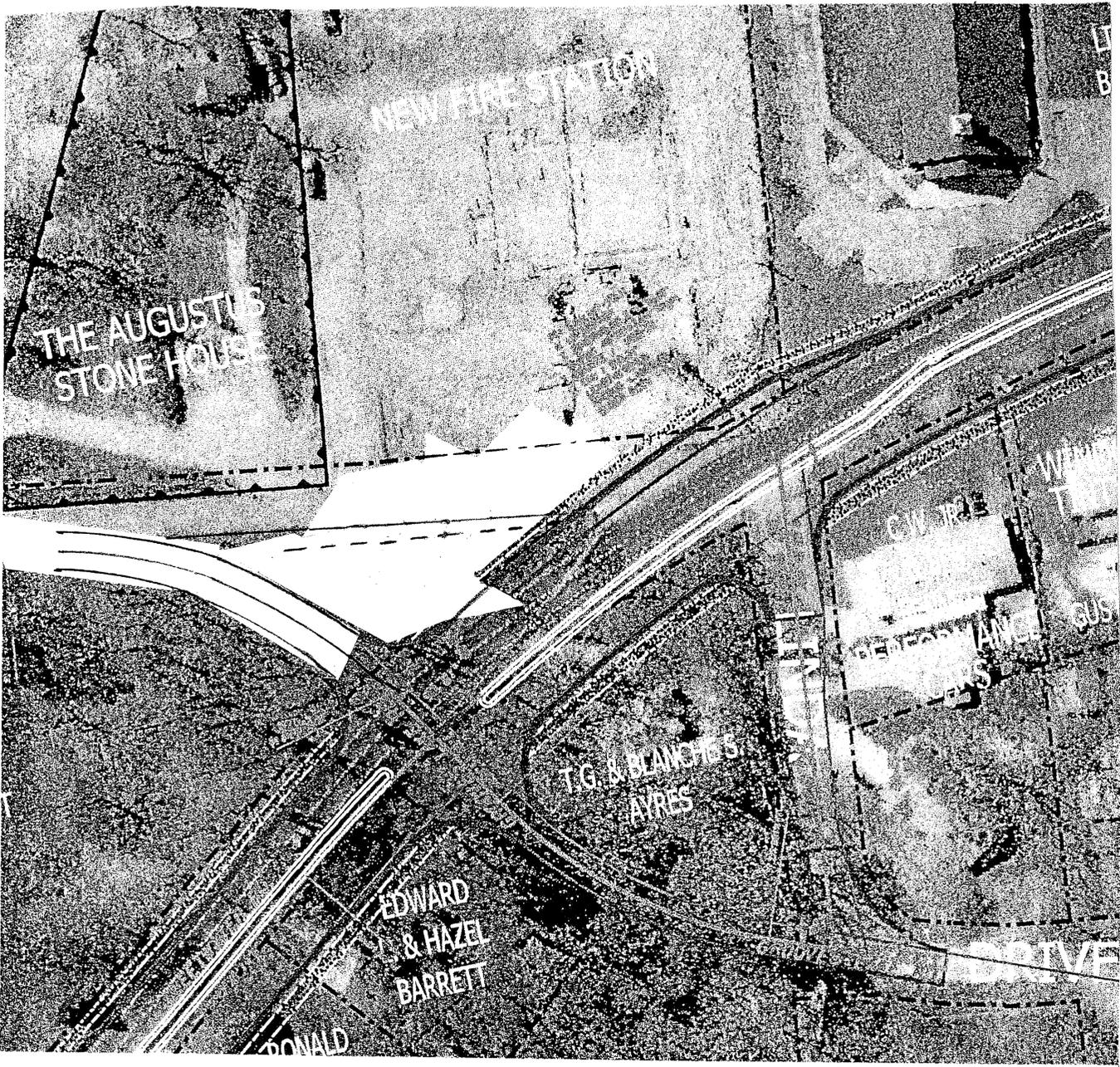
PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
Douglas County, Georgia Department of Transportation, District 7  
*Preliminary Design Stage*

ALTERNATIVE NO.:

PHI-1

AS DESIGNED     ALTERNATIVE

SHEET NO.: 2 of 5

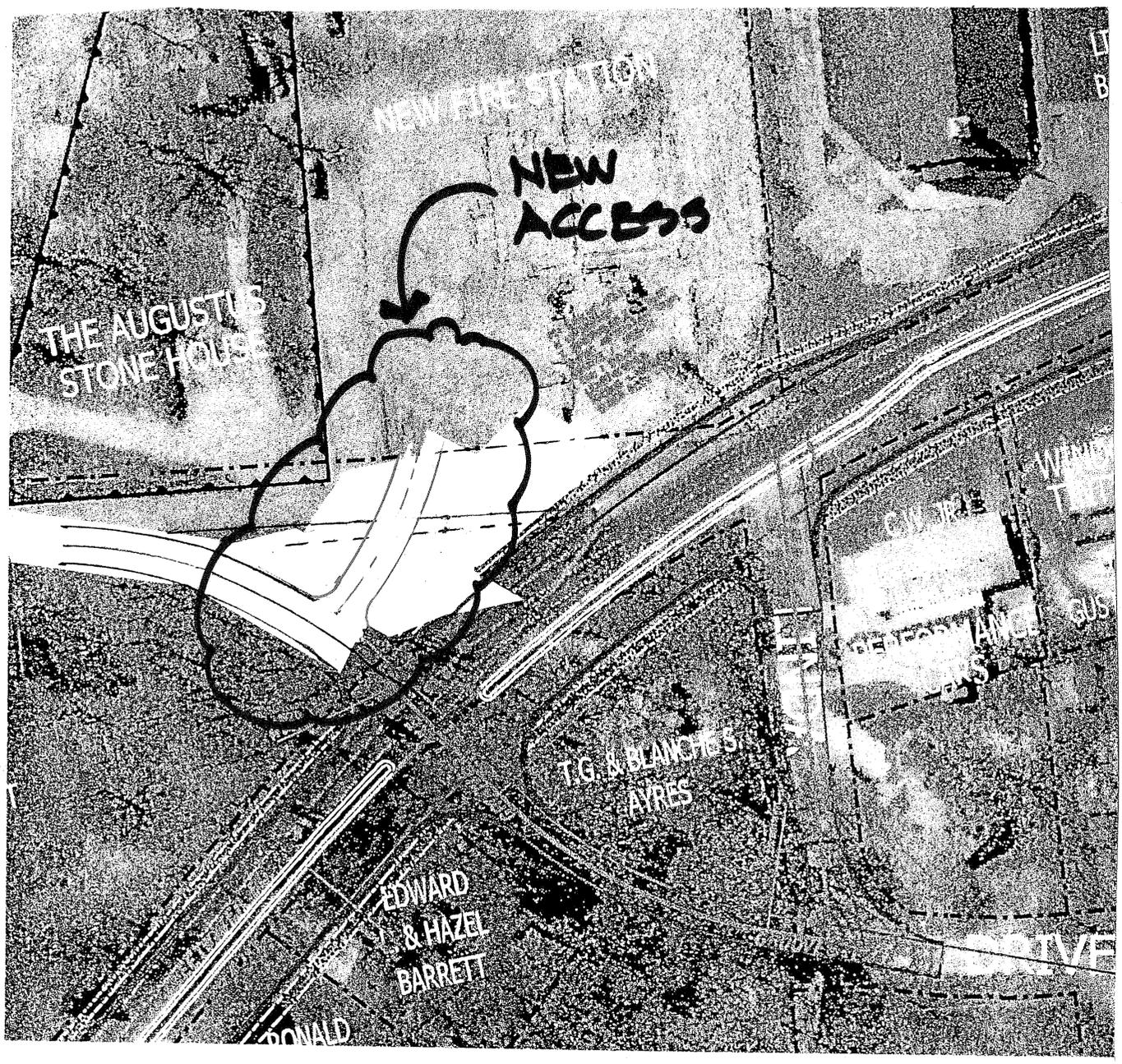


PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
Douglas County, Georgia Department of Transportation, District 7  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
*PH1-1*

AS DESIGNED  ALTERNATIVE

SHEET NO.: *3* of *5*



# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
Douglas County, Georgia Department of Transportation, District 7  
*Preliminary Design Stage*

ALTERNATIVE NO.:

PHI-1

SHEET NO.: 4 of 5

Quantities for Access Rd.  $L = \pm 130\text{ft}$ ,  $W = 24\text{ft}$

Asphalt Roadway

$$\text{Area} = 24\text{ft} \cdot 130\text{ft} = 3120\text{ft}^2 \cdot \frac{\text{SY}}{9\text{ft}^2} = 347\text{SY}$$

Earthwork

Assume 3 ft deep, 44 ft wide

$$Q = 3\text{ft} \cdot 44\text{ft} \cdot 130\text{ft} \cdot \frac{\text{CY}}{27\text{ft}^3} = 636\text{CY}$$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: MSL-0004-00(427) **LEE/SWEETWATER ROADS WIDENING PHASE 1**  
 MSL-0004-00(428) **CR 817/LEE ROAD WIDENING PHASE 2**  
 NHS-0001-00(917) **I-20/LEE ROAD INTERCHANGE RECONSTRUCTION**  
**Douglas County, Georgia Department of Transportation, District 7**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**PH1-2**

DESCRIPTION: **ELIMINATE THE LINDA DRIVE/SOUTH SWEETWATER ROAD  
 INTERSECTION AND DESIGNATE LINDA DRIVE A CUL-DE-SAC**

SHEET NO.: **1 of 6**

**ORIGINAL DESIGN:** (Sketch attached)

Linda Drive is proposed to intersect with South Sweetwater Road at a slight skew. There is no median opening at Linda Drive; therefore, access is right-in, right-out only from northbound South Sweetwater Road.

**ALTERNATIVE:** (Sketch attached)

Eliminate the Linda Drive/South Sweetwater Road intersection and make Linda Drive a cul-de-sac.

**ADVANTAGES:**

- Improves safety
- Eliminates two side-by-side intersections
- Provides access to South Sweetwater Road via adjacent local streets
- Improves traffic flow
- Improves emergency vehicle accessibility from the new fire station

**DISADVANTAGES:**

- Requires use of alternate routes to access South Sweetwater Road
- Increases initial cost

**DISCUSSION:**

Eliminating the Linda Drive/South Sweetwater Road intersection improves both safety and traffic flow without major accessibility issues. As there is no median break at the Linda Drive/South Sweetwater Road intersection, the design can only accommodate a right-in, right-out flow. With the cul-de-sac, residents can use Groovers Lake Road extension to access South Sweetwater Road.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 27,600	—	\$ 27,600
ALTERNATIVE	\$ 36,746	—	\$ 36,746
SAVINGS	\$ (9,146)	—	\$ (9,146)



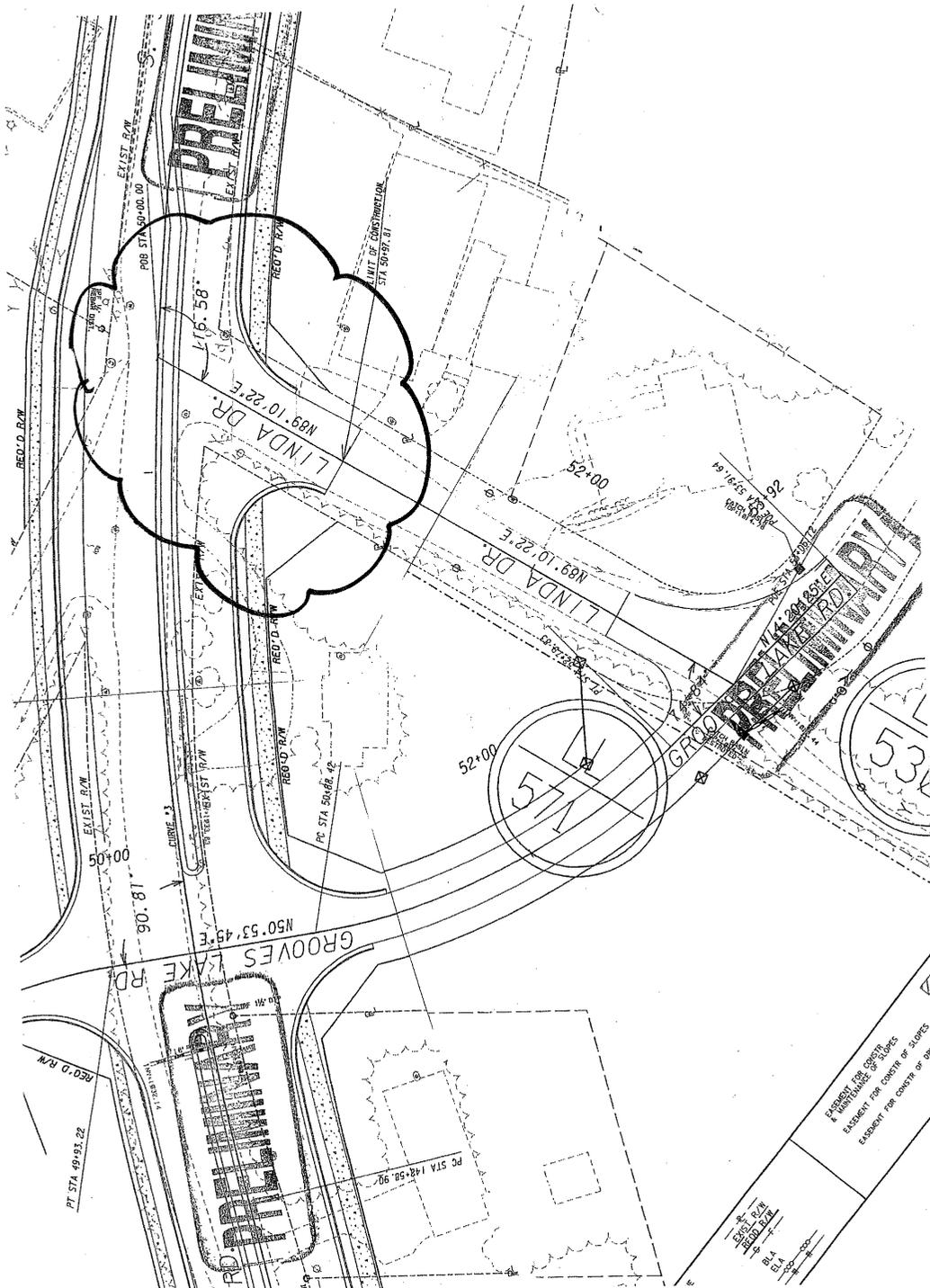
PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
Douglas County, Georgia Department of Transportation, District 7  
*Preliminary Design Stage*

ALTERNATIVE NO.:

PH1-2

AS DESIGNED       ALTERNATIVE

SHEET NO.: 2 of 6





PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
Douglas County, Georgia Department of Transportation, District 7  
*Preliminary Design Stage*

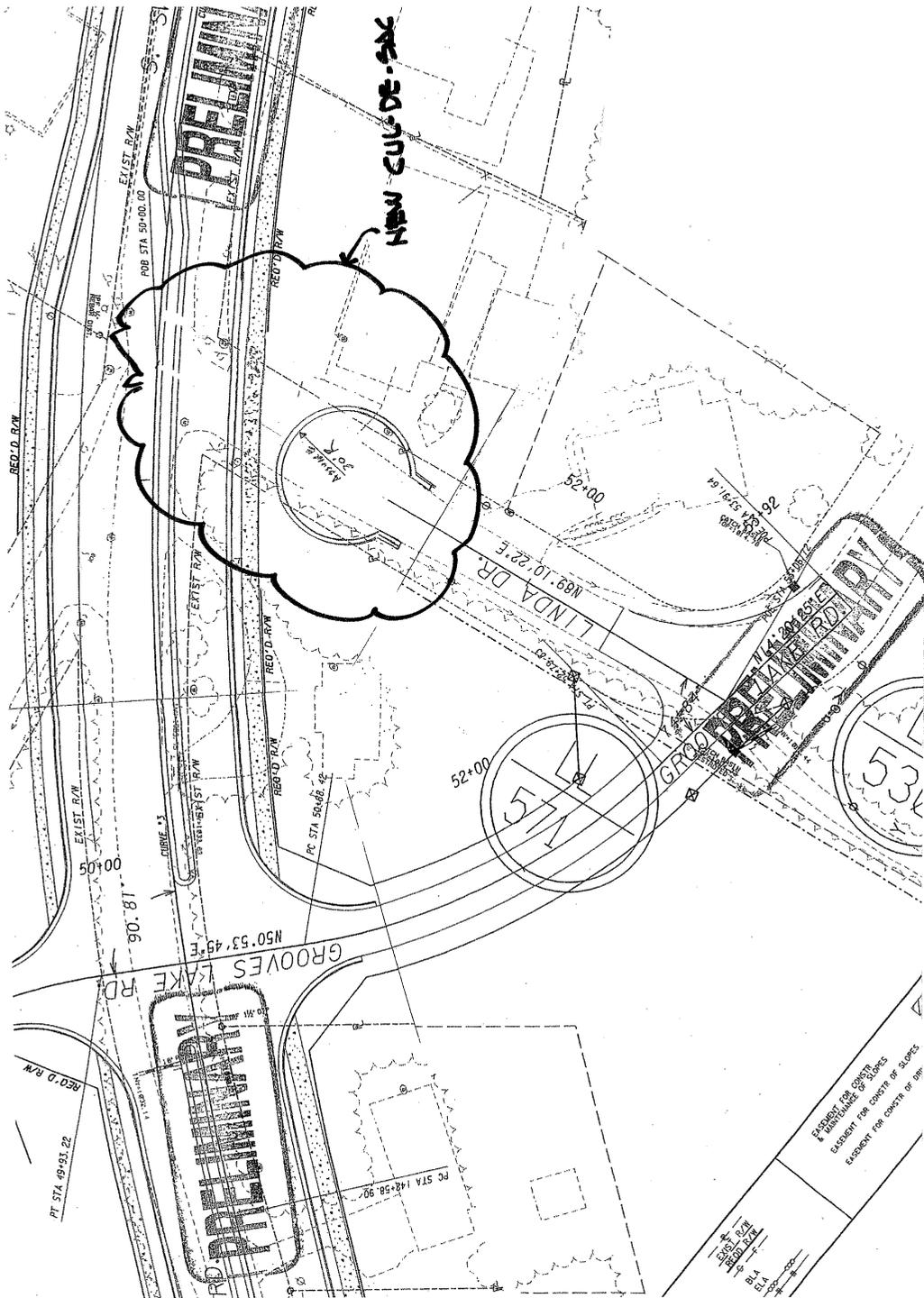
ALTERNATIVE NO.:

PH1-2

AS DESIGNED

ALTERNATIVE

SHEET NO.: 3 of 6



PROVIDE FOR  
MAINTENANCE OF SLOPES  
EQUIVALENT FOR CORNER OR SLOPES  
EQUIVALENT FOR CORNER OR SLOPES

DATE: 11/11/11  
BY: [Signature]

# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
 NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

ALTERNATIVE NO.:

PH1-2

SHEET NO.: 4 of 6

## ORIGINAL DESIGN QUANTITIES

C & G 180° @ 40' RADIUS

$$L = 40(180) \left( \frac{\pi}{180} \right) = 126 \text{ LF}$$

MULTI-USE AREA = 0

ASPHALT PAVING:

$$\left[ \frac{110 + 40}{2} (30) + 25(24) \right] / 9 = 317 \text{ SY}$$

## ALTERNATIVE DESIGN QUANTITIES

$$C \& G \quad 2(10) + 30(330) \left( \frac{\pi}{180} \right) + 80 = 273$$

$$\text{MULTI-USE AREA} = 80(8) / 9 = 71 \text{ SY}$$

ASPHALT PAVING

$$\left[ 10(24) + \pi(30^2) \right] / 9 = 341 \text{ SY}$$

# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
 NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

ALTERNATIVE NO.:

PH 1-2

SHEET NO.: 5 of 6

COST PER SQ YD FOR ASPHALT PAVING  
 INCLUDING AGG. BASE, BASE, BINDER,  
 AND SURFACE

- AGG. BASE  $12'' (3)(3) (150\#/CF) / 12 = 1350\#/SY$
- BASE  $4'' (3)(3) (150\#/CF) / 12 = 450\#/SY$
- BINDER  $2'' (3)(3) (150\#/CF) / 12 = 225\#/SY$
- SURFACE  $1.5'' (3)(3) (150\#/CF) / 12 = 169\#/SY$

$$\text{COST} = 1350 \left( \frac{325}{2000} \right) + (450 + 225 + 169) \left( \frac{100}{2000} \right)$$

$$= 16.87 + 42.20 = 59.07$$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: MSL-0004-00(427) **LEE/SWEETWATER ROADS WIDENING PHASE 1**  
 MSL-0004-00(428) **CR 817/LEE ROAD WIDENING PHASE 2**  
 NHS-0001-00(917) **I-20/LEE ROAD INTERCHANGE RECONSTRUCTION**  
**Douglas County, Georgia Department of Transportation, District 7**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**PH1-6**

DESCRIPTION: **REPLACE THE MULTI-USE TRAIL ON THE EAST SIDE OF LEE ROAD WITH A SIDEWALK**

SHEET NO.: **1 of 4**

**ORIGINAL DESIGN:**

The current design calls for the use of a 5-ft. concrete sidewalk on the west side of Lee Road and an 8-ft. asphalt multi-use trail on the east side. The multi-use trail is to be constructed between Station (STA) 105+95 to STA 202+10, for a total 9,165 ft.

**ALTERNATIVE:**

Replace the east side multi-use trail with a sidewalk.

**ADVANTAGES:**

- Extends the pavement life of the sidewalks
- Accelerates construction
- Potential decrease in temporary construction easement
- Symmetrical design/construction
- Reduces maintenance cost

**DISADVANTAGES:**

- Increases initial cost
- Decreases recreational value (for bicycling or other non-pedestrian mode of travel only)
- Loses amenity

**DISCUSSION:**

After completing the analysis of this alternative, it was determined that because the cost per linear ft. of sidewalk is actually higher than the cost of the multi-use trail per linear ft., this alternative substantially increases initial costs. However, unit price validations may make this alternative attractive in the near future from a first cost view point.

The width of the right-of-way is not affected by using either a 5-ft. sidewalk or an 8-ft. multi-use trail.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 693,717	\$ 391,298	\$ 1,085,015
ALTERNATIVE	\$ 777,327	\$ 89,957	\$ 867,284
SAVINGS	\$ (83,610)	\$ 301,341	\$ 217,731

# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
 NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

ALTERNATIVE NO.:

PH 1-6,  
 PH 2-2,3  
 IR-4,7

Unit Price for Sidewalk & Multiuse Path

SHEET NO.: 2 of 4

Right of Way requirements are not changed whether or not sidewalk & multiuse paths are constructed. Therefore the only unit cost to be developed will be construction cost.

Cost:

**Sidewalk (5ft wide)**

$$\text{PH2 } \$55/\text{SY} \cdot \frac{1\text{SY}}{9\text{ft}^2} \cdot 5\text{ft} = \$30.56/\text{ft} \text{ PH2}$$

$$\text{PH1 } \$60 \cdot \frac{1\text{SY}}{9\text{ft}^2} \cdot 5\text{ft} = \$33.33/\text{ft} \text{ PH1}$$

$$\text{IC } \$26.41 \cdot \frac{1\text{SY}}{9\text{ft}^2} \cdot 5\text{ft} = \$14.67/\text{ft} \text{ I.C.}$$

**Multiuse Trail (8ft wide)**

PH1 \$100/TN  
 PH2 \$92/TN  
 IC \$75/TN

Asphalt \$92/TN (4in)

Agg Base \$15/TN (8in)

110lb/sy Per In.

$$\text{Asphalt} = 110\frac{\text{lb}}{\text{sy}} \cdot 4 \cdot \frac{1\text{TN}}{2000\text{lb}} \cdot \frac{1\text{SY}}{9\text{ft}^2} \cdot 8\text{ft} \cdot \$92/\text{TN}$$

$$= \$18 \text{ PH2} \\ = \$19.56 \text{ PH1} \\ = \$14.67 \text{ IC}/\text{ft}$$

PH1 \$15  
 PH2 \$15  
 IC \$20

$$\text{Agg Base} = 110\frac{\text{lb}}{\text{sy}} \cdot 8 \cdot \frac{1\text{TN}}{2000\text{lb}} \cdot \frac{1\text{SY}}{9\text{ft}^2} \cdot 9\text{ft} \cdot \$15/\text{TN}$$

$$= \$6.60 \text{ PH2} \\ = \$8.80/\text{ft}$$

Multiuse Trail =	\$26.16/ft	PH1
	\$24.60/ft	PH2
	\$23.47/ft	IC



# LIFE CYCLE COST WORKSHEET



PROJECT: MSL-0004-00(427) LEE / SWEETWATER RDs WIDENING PH 1, MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PH 2, NHS-0001-00(917) I-20 / LEE ROAD I.C. RECONSTRUCTION Douglas County, Georgia Department of Transportation, District 7 <i>Preliminary Design Stage</i>	ALTERNATIVE NO. <h2 style="margin: 0;">PH1-6</h2> SHEET NO. 4 of 4
---	---

LIFE CYCLE PERIOD: <u>35</u> years INTEREST RATE: <u>2.50%</u> ESCALATION RATE: _____		
<b>A. INITIAL COST</b>	693,717	777,327
Useful Life (Years)		
<b>INITIAL COST SAVINGS</b>		(83,610)
<b>B. RECURRENT COSTS (Annual Expenditures)</b>		
1. Maintenance: Assume 0.5% of initial cost for yearly maintenance	3,469	
2. Operating		3,887
3. Energy		
4.		
<b>Total Annual Costs</b>	3,469	3,887
<i>(An effective rate of 2.50% with 0.00% Interest and 2.50% Escal.)</i> <b>Present Worth Factor</b>	23.1452	23.1452
<b>Present Worth of RECURRENT COSTS</b>	80,281	89,957
<b>C. SINGLE EXPENDITURES</b>	<b>Year</b>	<b>Amount</b>
ORIG PROP < Put "x" in appropriate box (original design or proposed design)	<b>PW factor</b>	<b>Present Worth</b>
x 1. Resurfacing (See Calculation Sheet: \$7.33 / LF (for 1.5" thick wearing course) x 9,615 LF = \$70,478) + Markup at 21.28% = \$85,476	7	85,476
x 2. Resurfacing (See above)	14	85,476
x 3. Repaving (See Calculation Sheet: \$19.56 / LF (for 4" thick bearing course) x 9,615 LF = \$188,069) + Markup at 21.28% = \$228,091	21	228,091
x 4. Resurfacing (See above)	28	85,476
5.		
1.0000		
-		
-		
<b>D. SALVAGE VALUE</b>	<b>Year</b>	<b>Amount</b>
1.		
2.		
1.0000		
1.0000		
-		
-		
<b>Present Worth of SINGLE EXPENDITURES</b>		311,017
<b>E. Total Recurrent Costs &amp; Single Expenditures (B + C)</b>		391,298
<b>RECURRENT COSTS &amp; SINGLE EXPENDITURES SAVINGS</b>		301,341
<b>TOTAL PRESENT WORTH COST (A + D)</b>		1,085,015
<b>TOTAL LIFE CYCLE SAVINGS</b>		217,731

# VALUE ENGINEERING ALTERNATIVE



PROJECT: MSL-0004-00(427) **LEE/SWEETWATER ROADS WIDENING PHASE 1**  
 MSL-0004-00(428) **CR 817/LEE ROAD WIDENING PHASE 2**  
 NHS-0001-00(917) **I-20/LEE ROAD INTERCHANGE RECONSTRUCTION**  
**Douglas County, Georgia Department of Transportation, District 7**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**PH1-7**

DESCRIPTION: **ELIMINATE THE COOPER CIRCLE/SOUTH SWEETWATER ROAD INTERSECTION AND DESIGNATE COOPER CIRCLE A CUL-DE-SAC**

SHEET NO.: **1 of 5**

**ORIGINAL DESIGN:** (Sketch attached)

The original design has Cooper Circle intersecting with South Sweetwater Road at the proposed three-lane road section. Left and right turns are permitted in and out of Cooper Circle from South Sweetwater Road.

**ALTERNATIVE:** (Sketch attached)

Eliminate the Cooper Circle/South Sweetwater Road intersection and make Cooper Circle a cul-de-sac.

**ADVANTAGES:**

- Improves safety
- Provides access to South Sweetwater Road via adjacent local streets
- Improves traffic flow

**DISADVANTAGES:**

- Requires alternate routes to access South Sweetwater Road
- Increases initial cost

**DISCUSSION:**

Eliminating the Cooper Circle/South Sweetwater Road intersections improves both safety and traffic flow without major accessibility issues. With the cul-de-sac, residents would use Cooper Street to access South Sweetwater Road.

It is noted that Cooper Circle was not included in any of the traffic studies provided.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 28,746	—	\$ 28,746
ALTERNATIVE	\$ 38,169	—	\$ 38,169
SAVINGS	\$ (9,423)	—	\$ (9,423)





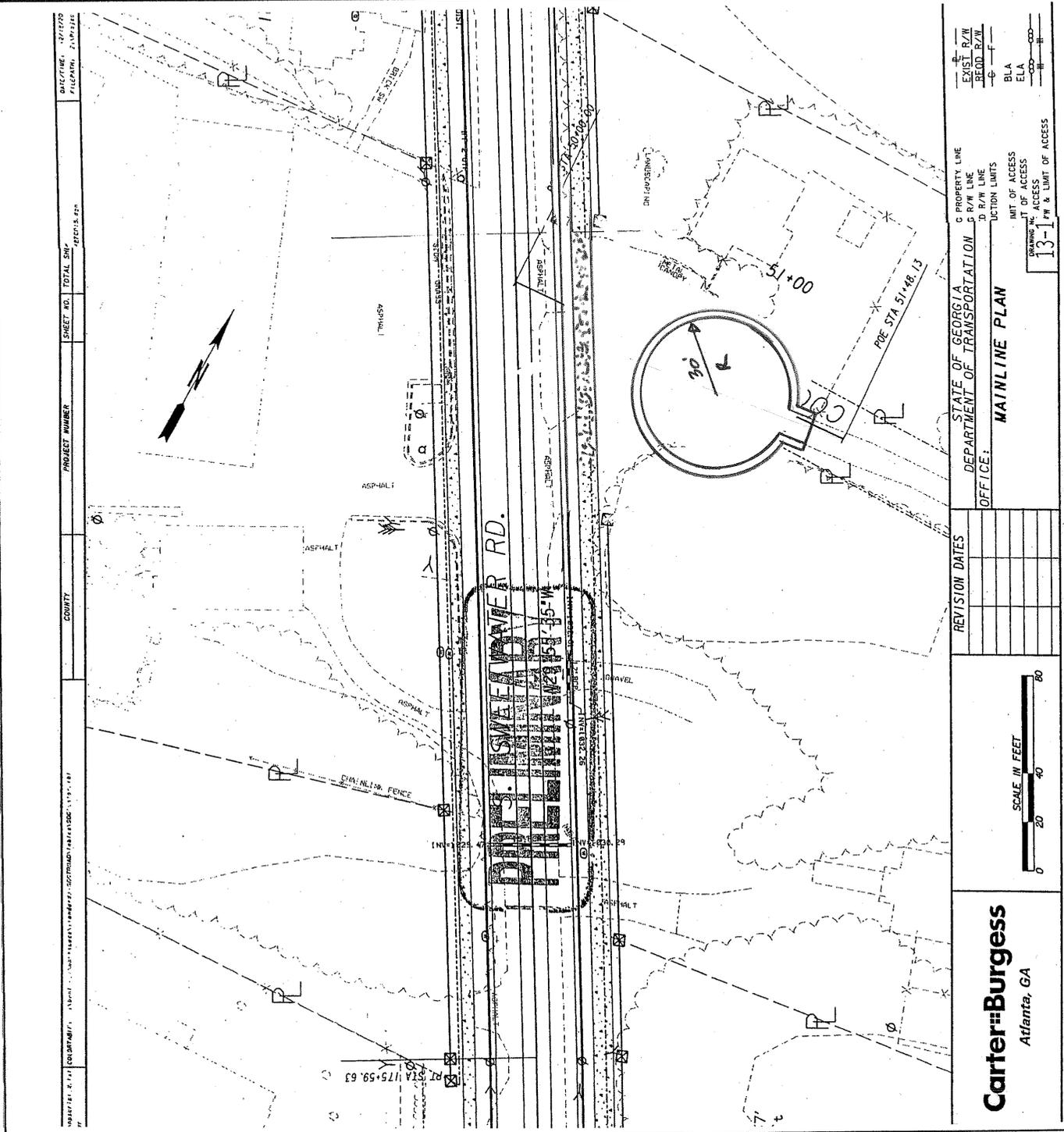
PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
 NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

ALTERNATIVE NO.:

PH 1-7

AS DESIGNED     ALTERNATIVE

SHEET NO.: 3 of 5



STATE OF GEORGIA  
 DEPARTMENT OF TRANSPORTATION  
 OFFICE: **MAINLINE PLAN**

REVISION DATES

NO.	DATE	DESCRIPTION

SCALE IN FEET: 0 20 40 80

CARTERBURGESS  
 Atlanta, GA

DRAWING NO. 13-1 PW & LIMIT OF ACCESS

DATE/TIME	FILE/REV.	SHEET NO.	TOTAL SHEETS	PROJECT NUMBER	COUNTY

# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
 NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

ALTERNATIVE NO.:

PH 1-7

SHEET NO.: 4 of 5

## ORIGINAL DESIGN QUANTITIES

C & G: 180° @ 40' RADIUS

$$L = 40 (180) (\pi/180) = 126 \text{ LF}$$

MULTI-USE AREA = 0

$$\text{ASPHALT PAVING: } \left[ \frac{(100+23)(40)}{2} + 12(47) \right] / 9 = 333 \text{ SY}$$

## ALTERNATIVE DESIGN QUANTITIES:

$$\text{C \& G } 2(10) + 30(330) (\pi/180) + 120 = 313 \text{ LF}$$

$$\text{MULTI-USE AREA} = 8(120) / 9 = 107 \text{ SY}$$

ASPHALT PAVING

$$\left[ 12(10) + \pi(30^2) \right] / 9 = 327 \text{ SY}$$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: MSL-0004-00(427) LEE/SWEETWATER ROADS WIDENING PHASE 1  
 MSL-0004-00(428) CR 817/LEE ROAD WIDENING PHASE 2  
 NHS-0001-00(917) I-20/LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**PH1-8**

DESCRIPTION: **ELIMINATE THE INMAN STREET/SOUTH SWEETWATER ROAD INTERSECTION AND DESIGNATE INMAN STREET A CUL-DE-SAC**

SHEET NO.: **1 of 5**

**ORIGINAL DESIGN:** (Sketch attached)

The original design has Inman Street intersecting with South Sweetwater Road at the proposed three-lane road section. Left and right turns are permitted in and out of Inman Street from South Sweetwater Road.

**ALTERNATIVE:** (Sketch attached)

Eliminate the Inman Street/South Sweetwater Road intersection and make Inman Street a cul-de-sac.

**ADVANTAGES:**

- Improves safety
- Provides access to South Sweetwater Road via adjacent local streets
- Improves traffic flow

**DISADVANTAGES:**

- Requires alternate routes to access South Sweetwater Road
- Increases initial cost

**DISCUSSION:**

Eliminating the Inman Street/South Sweetwater Road intersection improves both safety and traffic flow without major accessibility issues. With the cul-de-sac, residents would use Florence Drive to access Bankhead Highway and use Florence Drive and Junior High Drive to access South Sweetwater Road.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 14,705	\$	\$ 14,705
ALTERNATIVE	\$ 36,094	\$	\$ 36,094
SAVINGS	\$ (21,389)	\$	\$ (21,389)





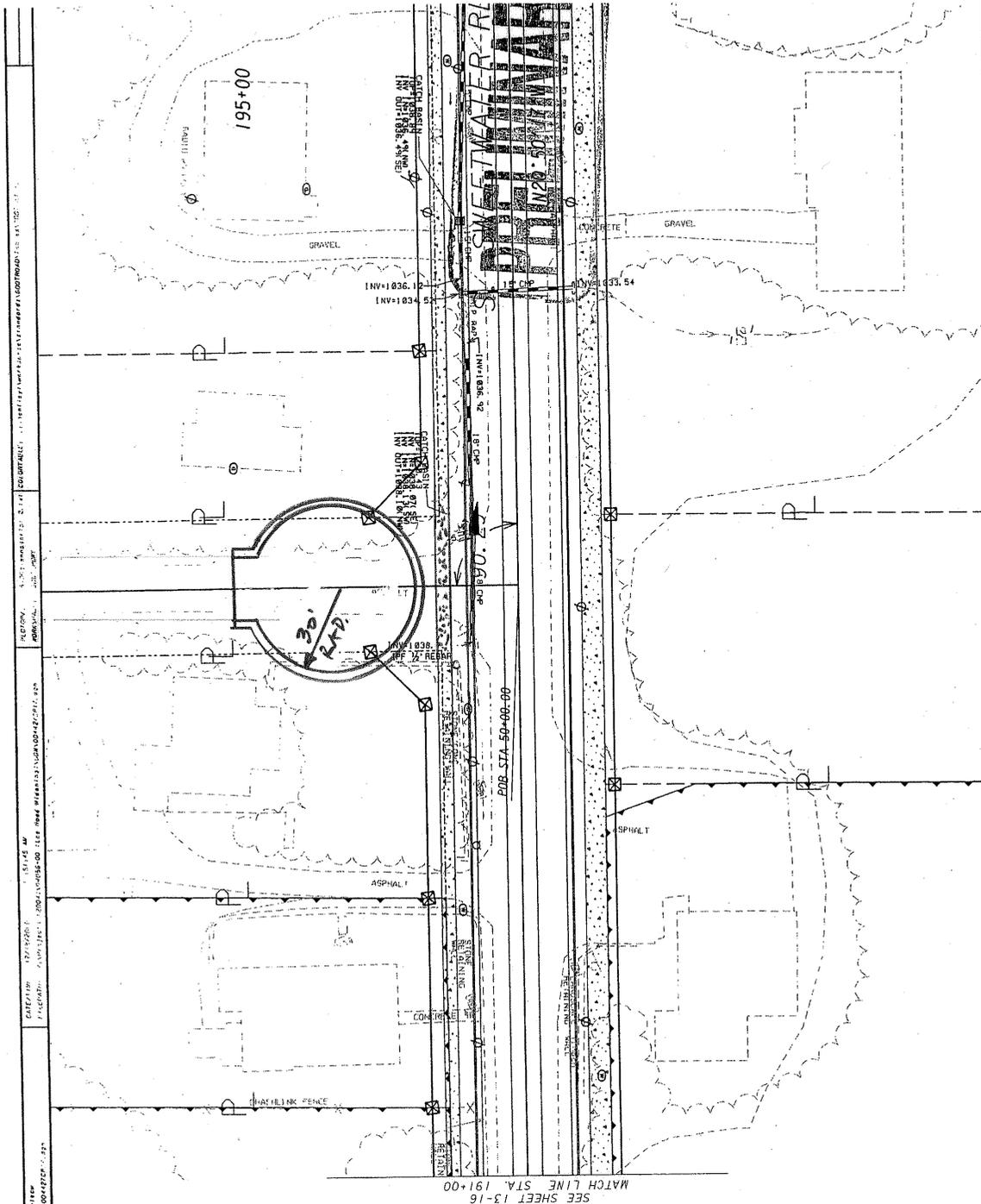
PROJECT: **MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,**  
**MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,**  
**NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION**  
**Douglas County, Georgia Department of Transportation, District 7**  
**Preliminary Design Stage**

ALTERNATIVE NO.:

PH 1-8

AS DESIGNED     ALTERNATIVE

SHEET NO.: 3 of 3



**Carter Burgess**  
Atlanta, GA

- EASEMENT FOR CONSTR. & MAINTENANCE OF SLOPES
- EASEMENT FOR CONSTR. OF SLOPES
- EASEMENT FOR CONSTR. OF DRYES

- EXISTING PROPERTY LINE
- EXISTING R/W LINE
- REQUIRED R/W LINE
- CONSTRUCTION LIMITS
- BEGIN LIMIT OF ACCESS
- END LIMIT OF ACCESS
- LIMIT OF ACCESS
- RECD. R/W & LIMIT OF ACCESS

SEE SHEET 13-16  
MATCH LINE STA. 191+00

# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
 NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

ALTERNATIVE NO.:

PH 1 - 8

SHEET NO.: 4 of 5

## ORIGINAL DESIGN QUANTITIES

C & G: 180° @ 40' RADIUS

$$L = 40 (180) (\pi/180) = 126 \text{ LF}$$

SIDEWALK AREA = 0

$$\text{ASPHALT PAVING: } \left( \frac{60+22}{2} \right) (30) / 9 = 137 \text{ SY}$$

## ALTERNATIVE DESIGN QUANTITIES:

$$\text{C \& G } 2(10) + 30(330) (\pi/180) + 70 = 263 \text{ LF}$$

$$\text{SIDEWALK AREA} = 5(40) / 9 = 22 \text{ SY}$$

ASPHALT PAVING

$$[22(10) + \pi(30^2)] / 9 = 339 \text{ SY}$$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: MSL-0004-00(427) **LEE/SWEETWATER ROADS WIDENING PHASE 1**  
 MSL-0004-00(428) **CR 817/LEE ROAD WIDENING PHASE 2**  
 NHS-0001-00(917) **I-20/EE ROAD INTERCHANGE RECONSTRUCTION**  
**Douglas County, Georgia Department of Transportation, District 7**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**PH1-9**

DESCRIPTION: **ELIMINATE THE HOUSTON STREET/SOUTH SWEETWATER  
 ROAD INTERSECTION AND DESIGNATE HOUSTON STREET A  
 CUL-DE-SAC**

SHEET NO.: **1 of 5**

**ORIGINAL DESIGN:** (Sketch attached)

The original design has Houston Street intersecting with South Sweetwater Road at the proposed three-lane road section. Left and right turns are permitted in and out of Houston Street from South Sweetwater Road.

**ALTERNATIVE:** (Sketch attached)

Eliminate the Houston Street/South Sweetwater Road intersection and make Houston Street a cul-de-sac.

**ADVANTAGES:**

- Improves safety
- Provides access to South Sweetwater Road via adjacent local streets
- Improves traffic flow

**DISADVANTAGES:**

- Requires alternate routes to access South Sweetwater Road
- Increases initial cost

**DISCUSSION:**

Eliminating the Houston Street/South Sweetwater Road intersection improves both safety and traffic flow without major accessibility issues. With the cul-de-sac, residents would use Lucille Avenue or Johnson Street to access Bankhead highway and Lucille Avenue and Cooper Street to access South Sweetwater Road.

It is noted that the intersection of Sweetwater Road and Bankhead Highway is only 240 ft. north of the Houston Street/Sweetwater Road intersection.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 26,239	—	\$ 26,239
ALTERNATIVE	\$ 38,226	—	\$ 38,226
SAVINGS	\$ (11,987)	—	\$ (11,987)



# SKETCHES



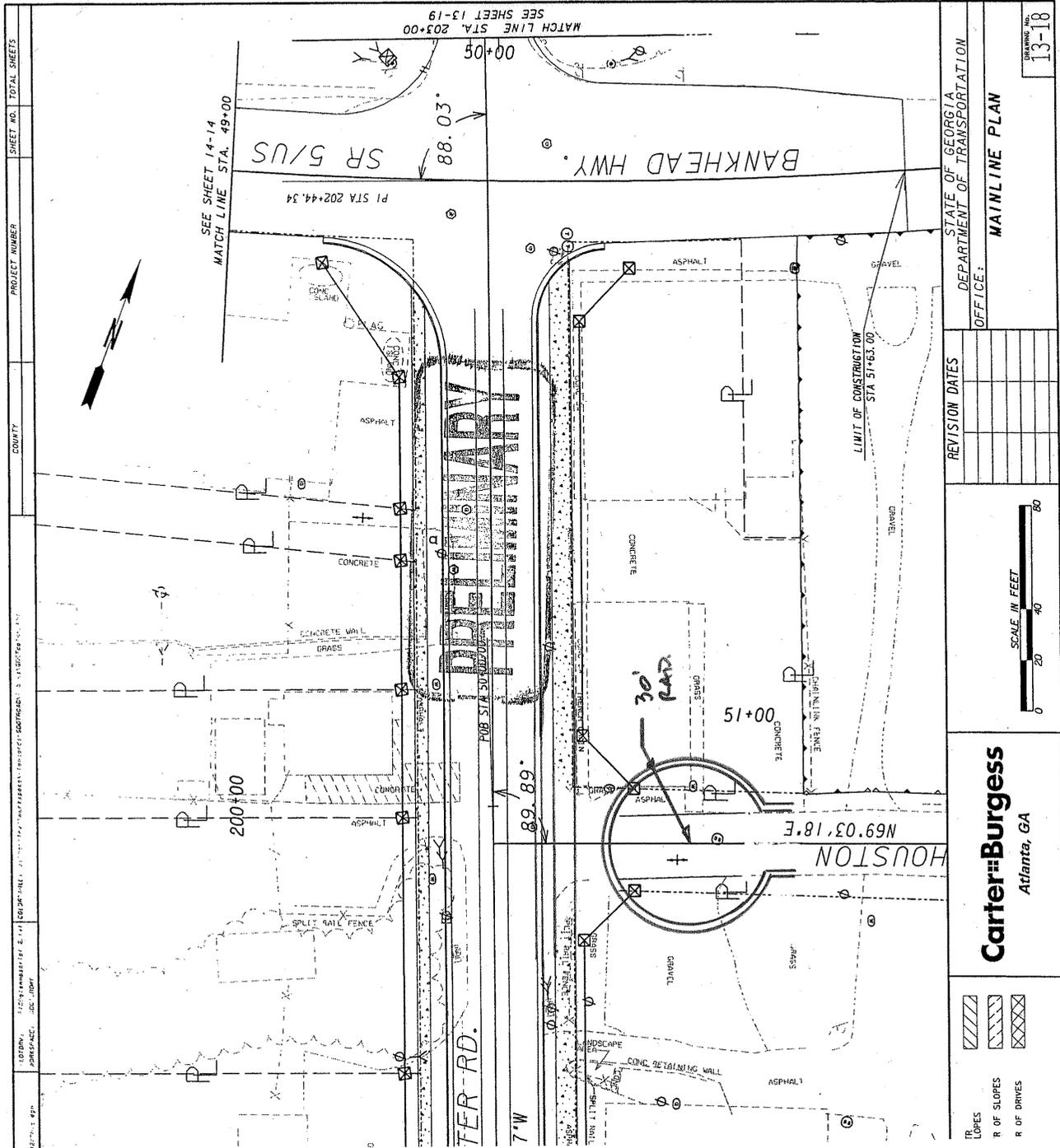
PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
 NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

ALTERNATIVE NO.:

PH1-9

AS DESIGNED  ALTERNATIVE

SHEET NO.: 3 of 5



STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION		OFFICE: <b>MAINLINE PLAN</b>	DRAWING NO. <b>13-18</b>								
REVISION DATES											
<table border="1"> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>											<b>Carter Burgess</b> Atlanta, GA
<table border="1"> <tr> <td></td> <td>R OF SLOPES</td> </tr> <tr> <td></td> <td>R OF DRIVES</td> </tr> </table>			R OF SLOPES		R OF DRIVES						
	R OF SLOPES										
	R OF DRIVES										

# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
 NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

ALTERNATIVE NO.:

PH 1-9

SHEET NO.: 4 of 5

## ORIGINAL DESIGN QUANTITIES

C & G: 180° @ 40' RADIUS

$$L = 40 (180) (\pi/180) = 126 \text{ LF}$$

MULTI-USE AREA = 0

$$\text{ASPHALT PAVING: } \left[ \left( \frac{75+24}{2} \right) (30) + 24(50) \right] / 9 = 298 \text{ SY}$$

## ALTERNATIVE DESIGN QUANTITIES:

$$\text{C \& G } 2(10) + 30(330) (\pi/180) + 80 = 273 \text{ LF}$$

$$\text{MULTI-USE AREA} = 8(50) / 9 = 44 \text{ SY}$$

ASPHALT PAVING

$$\left[ 24(10) + \pi(30^2) \right] / 9 = 341 \text{ SY}$$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: MSL-0004-00(427) **LEE/SWEETWATER ROADS WIDENING PHASE 1**  
 MSL-0004-00(428) **CR 817/LEE ROAD WIDENING PHASE 2**  
 NHS-0001-00(917) **I-20/LEE ROAD INTERCHANGE RECONSTRUCTION**  
**Douglas County, Georgia Department of Transportation, District 7**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**PH2-2**

DESCRIPTION: **REPLACE THE MULTI-USE TRAIL ON THE EAST SIDE OF LEE ROAD WITH A SIDEWALK**

SHEET NO.: **1 of 4**

**ORIGINAL DESIGN:**

The current design calls for the use of a 5-ft. concrete sidewalk on the west side of Lee Road and an 8-ft. asphalt multi-use trail on the east side. The multi-use trail is to be constructed between Station (STA) 100+65 to STA 153+65, for a total 5,300 ft.

**ALTERNATIVE:**

Replace the 8-ft. multi-use trail on the east side of Lee Road with a 5-ft. sidewalk.

**ADVANTAGES:**

- Extends pavement life of the sidewalks
- Accelerates construction
- Potential decrease in temporary construction easement
- Symmetrical design/construction
- Reduces maintenance cost

**DISADVANTAGES:**

- Increases initial cost
- Decreases recreational value (for bicycling or other non-pedestrian mode of travel only)
- Loses amenity

**DISCUSSION:**

After completing the analysis of this alternatives, it was determined that because the cost per linear ft. of sidewalk is actually higher than the cost of the multi-use trail per linear ft., this alternative substantially increases initial cost. However, unit price validations may make this alternative attractive in the near future from a first cost view point.

The width of the right-of-way is not affected by using either a 5-ft. sidewalk or an 8-ft. multi-use trail.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 354,560	\$ 198,859	\$ 553,419
ALTERNATIVE	\$ 392,870	\$ 45,464	\$ 438,335
SAVINGS	\$ (38,310)	\$ 153,394	\$ 115,084

# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
 NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

ALTERNATIVE NO.:

PH1-6,  
 PH2-2,3  
 IR-4,7

Unit Price for Sidewalk & Multiuse Path

SHEET NO.: 2 of 4

Right of Way requirements are not changed whether or not sidewalk & multiuse paths are constructed. Therefore the only unit cost to be developed will be construction cost.

Cost:

**Sidewalk** (5ft wide)

$$\begin{aligned} & \text{PH2 } \$55/\text{SY} \cdot \frac{1\text{SY}}{9\text{ft}^2} \cdot 5\text{ft} = \\ & \text{PH1 } \$60 \\ & \text{IC } \$26.41 \end{aligned}$$

\$30.56/ft	PH2 ←
\$33.33/ft	PH1
\$14.67/ft	I.C.

110lb/sy Per In.

**Multiuse Trail** (8ft wide)

PH1 \$100/TN  
 PH2 \$92/TN  
 IC \$75/TN

Asphalt \$92/TN (4in)  
 Agg Base \$15/TN (8in)

$$\begin{aligned} \text{Asphalt} &= 110\frac{\text{lb}}{\text{sy}} \cdot 4 \cdot \frac{1\text{TN}}{2000\text{lb}} \cdot \frac{1\text{SY}}{9\text{ft}^2} \cdot 8\text{ft} \cdot \$92/\text{TN} \\ &= \$18 \text{ PH2 ←} \\ &= \$19.56 \text{ PH1} \\ &= \$14.67 \text{ I.C.} \\ \text{Agg Base} &= 110\frac{\text{lb}}{\text{sy}} \cdot 8 \cdot \frac{1\text{TN}}{2000\text{lb}} \cdot \frac{1\text{SY}}{9\text{ft}^2} \cdot 9\text{ft} \cdot \$15/\text{TN} \\ &= \$6.60 \text{ PH2} \\ &= \$8.80/\text{ft} \end{aligned}$$

PH1 \$15  
 PH2 \$15  
 IC \$20

Multiuse Trail =	\$26.16/ft	PH1
	\$24.60/ft	PH2 ←
	\$23.47/ft	I.C.



# LIFE CYCLE COST WORKSHEET



PROJECT: MSL-0004-00(427) LEE / SWEETWATER RDs WIDENING PH 1, MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PH 2, NHS-0001-00(917) I-20 / LEE ROAD I.C. RECONSTRUCTION Douglas County, Georgia Department of Transportation, District 7 <i>Preliminary Design Stage</i>	ALTERNATIVE NO. <h2 style="margin: 0;">PH2-2</h2> SHEET NO. 4 of 4
---	---

<b>LIFE CYCLE PERIOD:</b> <u>35</u> years							
<b>INTEREST RATE:</b> <u>2.50%</u> <b>ESCALATION RATE:</b> _____		<b>ORIGINAL</b>	<b>PROPOSED</b>				
<b>A. INITIAL COST</b>		354,560	392,870				
<b>Useful Life (Years)</b>							
<b>INITIAL COST SAVINGS</b>			(38,310)				
<b>B. RECURRENT COSTS (Annual Expenditures)</b>							
1.	Maintenance: Assume 0.5% of initial cost for yearly maintenance	1,773					
2.	Operating		1,964				
3.	Energy						
4.							
<b>Total Annual Costs</b>		1,773	1,964				
<i>(An effective rate of 2.50% with 0.00% Interest and 2.50% Escal.)</i>		<b>Present Worth Factor</b>		23.1452	23.1452		
<b>Present Worth of RECURRENT COSTS</b>		41,032	45,465				
<b>C. SINGLE EXPENDITURES</b>		<b>Year</b>	<b>Amount</b>	<b>PW factor</b>	<b>Present Worth</b>	<b>Present Worth</b>	
ORIG	PROP	< Put "x" in appropriate box (original design or proposed design)					
x	1.	Resurfacing (See Calculation Sheet: \$6.75 / LF (for 1.5" thick wearing course) x 5,300 LF = \$35,775) + Markup at 21.28% = \$43,388	7	43,388	0.8413	36,501	-
x	2.	Resurfacing (See above)	14	43,388	0.7077	30,707	-
x	3.	Repaving (See Calculation Sheet: \$18.00 / LF (for 4" thick bearing course) x 5,300 LF = \$95,400) + Markup at 21.28% = \$115,701	21	115,701	0.5954	68,887	-
x	4.	Resurfacing (See above)	28	43,388	0.5009	21,732	-
	5.				1.0000	-	-
<b>D. SALVAGE VALUE</b>		<b>Year</b>	<b>Amount</b>	<b>PW factor</b>	<b>Present Worth</b>	<b>Present Worth</b>	
	1.			1.0000	-	-	
	2.			1.0000	-	-	
<b>Present Worth of SINGLE EXPENDITURES</b>					157,827	-	
<b>E. Total Recurrent Costs &amp; Single Expenditures (B + C)</b>				198,859	45,465		
<b>RECURRENT COSTS &amp; SINGLE EXPENDITURES SAVINGS</b>					153,394		
<b>TOTAL PRESENT WORTH COST (A + D)</b>				553,419	438,335		
<b>TOTAL LIFE CYCLE SAVINGS</b>					<b>115,084</b>		

# VALUE ENGINEERING ALTERNATIVE



PROJECT: MSL-0004-00(427) **LEE/SWEETWATER ROADS WIDENING PHASE 1**  
 MSL-0004-00(428) **CR 817/LEE ROAD WIDENING PHASE 2**  
 NHS-0001-00(917) **I-20/LEE ROAD INTERCHANGE RECONSTRUCTION**  
**Douglas County, Georgia Department of Transportation, District 7**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**PH2-3**

DESCRIPTION: **EXTEND THE MULTI-USE TRAIL TO SERVE THE  
 SWEETWATER CREEK RECREATIONAL AREA AND STATE  
 PARK ALONG CEDAR TERRACE ROAD**

SHEET NO.: **1 of 4**

**ORIGINAL DESIGN:**

The current design has an 8-ft. asphalt multi-use trail on the east side of Lee Road.

**ALTERNATIVE:**

Construct an 8-ft. asphalt multi-use trail along the south side of Cedar Terrace Road. The total length is 4,224 ft. and will require an additional 5-ft. width of right-of-way. Assume the necessary earthwork is 2' deep x 12' wide.

**ADVANTAGES:**

- Provides connection to the State Park
- Encourages use of the State Park
- Improves recreational value
- Allows project to comply with approved concept and intent
- Adds benefit/amenity

**DISADVANTAGES:**

- Increases initial cost
- Presents unknown design/construction challenges

**DISCUSSION:**

This alternative provides a connection to the Sweetwater Creek Recreational Area and State Park that is not currently indicated on the design documents. Although the costs are significant, the original intent was to have a recreational, multi-use trail connect Lee Road with the State Park.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 0	—	\$ 0
ALTERNATIVE	\$ 186,036	—	\$ 186,036
SAVINGS	\$ (186,036)	—	\$ (186,036)

# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
Douglas County, Georgia Department of Transportation, District 7  
*Preliminary Design Stage*

ALTERNATIVE NO.:

PH2-3

SHEET NO.: 2 of 4

Quantities:

Multuse Trail

$$L = 4,224 \text{ ft}$$

Earthwork

$$2 \text{ ft} \cdot 12 \text{ ft} \cdot 4,224 \text{ ft} \cdot \frac{1 \text{ CY}}{27 \text{ ft}^3} \\ = 3755 \text{ CY}$$

ROW

$$5 \text{ ft} \cdot 4224 \text{ ft} = 21,120 \text{ ft}^2$$

# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
 NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

ALTERNATIVE NO.:

PH1-6,  
 PH2-2,3  
 IR-4,7

Unit Price for Sidewalk & Multiuse Path

SHEET NO.: 3 of 4

Cost:

**Sidewalk** (5ft wide)

$$\begin{matrix} \text{PH2} & \$55/\text{SY} \\ \text{PH1} & \$60 \\ \text{IC} & \$26.41 \end{matrix} \cdot \frac{1\text{SY}}{9\text{ft}^2} \cdot 5\text{ft} =$$

\$30.56/ft	PH2
\$33.33/ft	PH1
\$14.67/ft	I.C.

110lb/sy Per In.

Multiuse Trail (8ft wide)

PH1 \$100/TN  
 PH2 \$92/TN  
 IC \$75/TN

Asphalt \$92/TN (4in)  
 Agg Base \$15/TN (8in)

$$\text{Asphalt} = 110\frac{\text{lb}}{\text{sy}} \cdot 4 \cdot \frac{1\text{TN}}{2000\text{lb}} \cdot \frac{1\text{SY}}{9\text{ft}^2} \cdot 8\text{ft} \cdot \$92/\text{TN}$$

$$= \begin{matrix} \$18 & \text{PH2} \\ \$19.56 & \text{PH1} \\ \$14.67 & \text{IC} \end{matrix} / \text{ft}$$

PH1 \$15  
 PH2 \$15  
 IC \$20

$$\text{Agg Base} = 110\frac{\text{lb}}{\text{sy}} \cdot 8 \cdot \frac{1\text{TN}}{2000\text{lb}} \cdot \frac{1\text{SY}}{9\text{ft}^2} \cdot 9\text{ft} \cdot \$15/\text{TN}$$

$$= \begin{matrix} \$6.60 & \text{PH1} \\ & \text{PH2} \end{matrix} / \text{ft}$$

Multiuse Trail =	\$26.16/ft	PH1
	\$24.60/ft	PH2
	\$23.47/ft	IC

PER EST. ROW = \$0.57/ft FOR RESIDENTIAL



# VALUE ENGINEERING ALTERNATIVE



PROJECT: MSL-0004-00(427) **LEE/SWEETWATER ROADS WIDENING PHASE 1,**  
 MSL-0004-00(428) **CR 817/LEE ROAD WIDENING PHASE 2,**  
 NHS-0001-00(917) **I-20/LEE ROAD INTERCHANGE RECONSTRUCTION**  
**Douglas County, Georgia Department of Transportation, District 7**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**PH2-4**

DESCRIPTION: **ELIMINATE THE NEW CONNECTION BETWEEN OLD  
 CHESTNUT LOG ROAD AND LEE ROAD**

SHEET NO.: **1 of 5**

**ORIGINAL DESIGN:** (Sketch attached)

The proposed design includes a new connector between Old Chestnut Log Road and Lee Road.

**ALTERNATIVE:** (Sketch attached)

Eliminate the new connector between Old Chestnut Log Road and Lee Road and allow local traffic to use Chestnut Log Loop for access to Lee Road and elsewhere.

**ADVANTAGES:**

- Improves safety
- Eliminates two side-by-side intersections
- Provides access to Lee Road via adjacent local streets
- Improves traffic flow
- Reduces initial cost

**DISADVANTAGES:**

- May require the intersection to be signalized (cost included below)
- Increases traffic volume on residential streets
- May require future local street upgrades (not included in costs below)

**DISCUSSION:**

Realizing the added burden on the local streets and increased traffic volumes in residential areas, this alternative improves the safety aspects of accessing Lee Road. Although not calculated as part of the savings, the local roads may have to be upgraded in the future. It is noted, however, that the local roads are already heavily used by traffic cutting through neighborhoods.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 237,493	—	\$ 237,493
ALTERNATIVE	\$ 87,928	—	\$ 87,928
SAVINGS	\$ 149,565	—	\$ 149,565



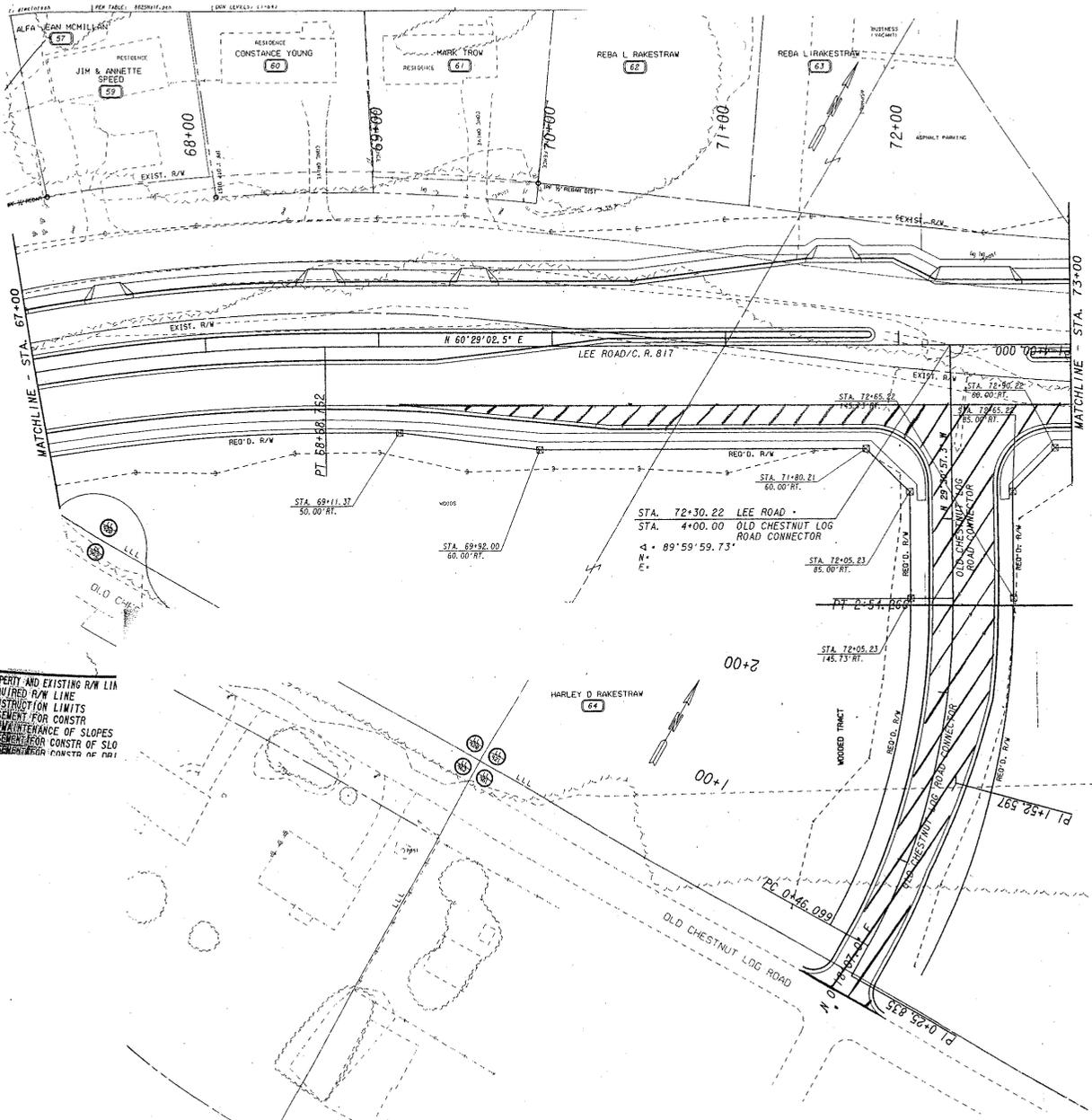
PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
 NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

ALTERNATIVE NO.:

PH2-4

AS DESIGNED     ALTERNATIVE

SHEET NO.: 2 of 5



OPENLY AND EXISTING R/W LIA  
 QU'IED R/W LINE  
 INSTRUCTION LIMITS  
 USEMENT FOR CONSTR  
 MAINTENANCE OF SLOPES  
 SENSATION CONSTA OF SLO  
 SENSATION CONSTA OF SLO

# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
Douglas County, Georgia Department of Transportation, District 7  
*Preliminary Design Stage*

ALTERNATIVE NO.:

PH2-4

Eliminate New Connection Between Old Chestnut Log Rd + Lee Rd

SHEET NO.: 3 of 5

Old Chestnut Log Rd. Connector:

$$\text{Pavement} - (354' \times 24 \div 9) + (164' \times 12 \div 9) + (100' \times 12 \div 9 + 2) = 1229.354$$

$$\text{Curb + Gutter} - 354' \times 2 \times 2' = 1416 \text{ LF}$$

$$\text{Pav't Markings - Yellow} - 354 \text{ LF}$$

$$\text{White} - 708 \text{ LF}$$

Lee Rd Widening:

$$\text{Pavement} - 400' \times 12 \div 9 = 533.354$$

$$\text{Pav't Markings - White} - 500 \text{ LF}$$

$$\text{R/W Reduction: } 354' \times 60 = 21240 \text{ SF}$$

$$533.3 \times 9 = 4800 \text{ SF}$$

# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
 NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

ALTERNATIVE NO.:

PH 2-4

SHEET NO.: 4 of 5

COST PER SQ YD FOR ASPHALT PAVING  
 INCLUDING AGG. BASE, BASE, BINDER,  
 AND SURFACE

AGG. BASE  $12'' (3)(3)(150\#/CF)/12 = 1350\#/SY$

BASE  $4'' (3)(3)(150\#/CF)/12 = 450\#/SY$

BINDER  $2'' (3)(3)(150\#/CF)/12 = 225\#/SY$

SURFACE  $1.5'' (3)(3)(150\#/CF)/12 = 169\#/SY$

$$\begin{aligned} \text{COST} &= 1350 \left(\frac{\$15}{2000}\right) + (450 + 225 + 169) \left(\frac{\$92}{2000}\right) \\ &= \$10.12 + \$38.82 = \$48.94/SY \end{aligned}$$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: MSL-0004-00(427) LEE/SWEETWATER ROADS WIDENING PHASE 1  
 MSL-0004-00(428) CR 817/LEE ROAD WIDENING PHASE 2  
 NHS-0001-00(917) I-20/LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**PH2-6**

DESCRIPTION: **EXTEND THE SCHOOL BUS TURNING LANE BETWEEN THE SWEETWATER ELEMENTARY SCHOOL ENTRANCE AND EAST COUNTY LINE ROAD ON LEE ROAD**

SHEET NO.: **1 of 4**

**ORIGINAL DESIGN:** (Sketch attached)

The proposed design narrows to two lanes between the acceleration lane for East County Line Road and the right-turn lane for the driveway entrance to Sweetwater Elementary School.

**ALTERNATIVE:** (Sketch attached)

Maintain three-lane widths between East County Line Road and the school's driveway entrance.

**ADVANTAGES:**

- Improves safety for school buses
- Improves traffic flow
- Adds benefit/value

**DISADVANTAGES:**

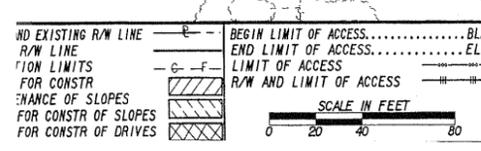
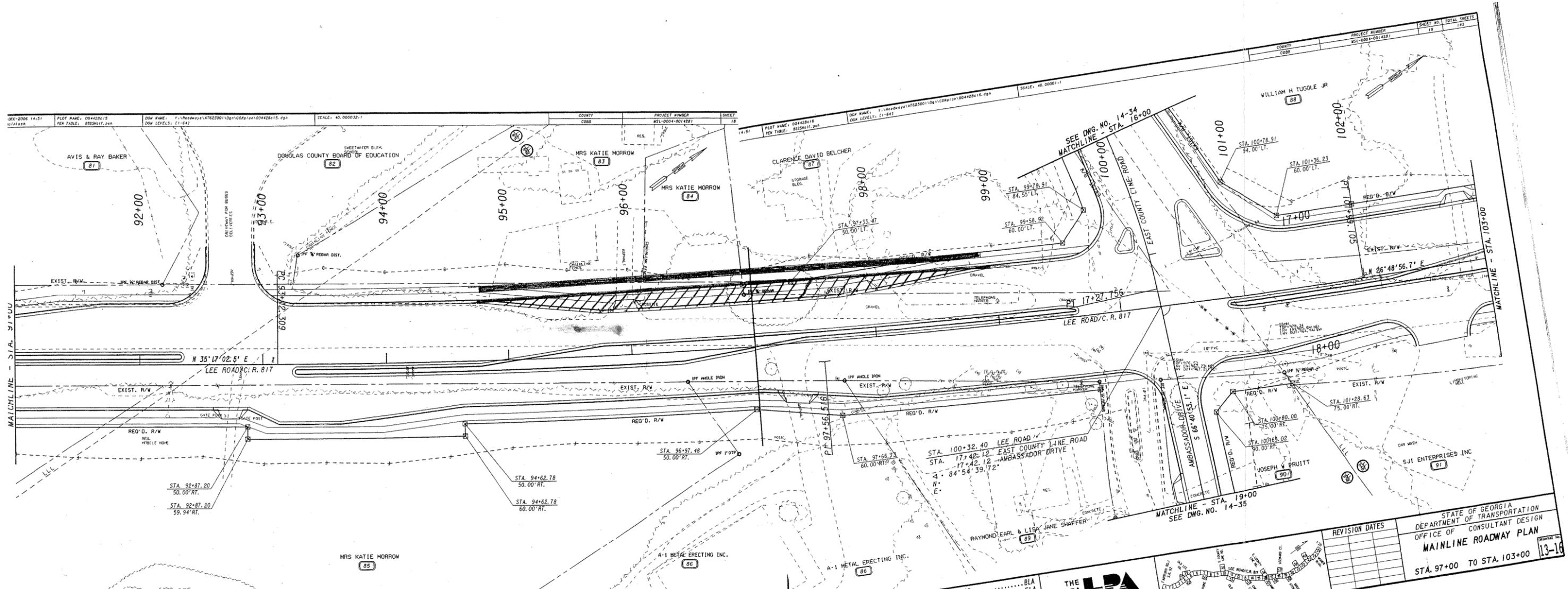
- Increases initial cost

**DISCUSSION:**

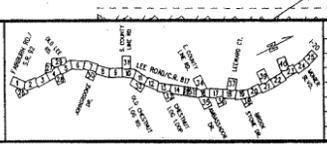
Although increasing initial costs, the safety of children and the school buses they ride is paramount. Extending the right-turn lane from the entrance to the elementary school to East County Line Road will improve safe passage for the buses.

It is noted that the lane could be limited to buses only at specific times during the day to further enhance the safety aspects of the lane.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 0	—	\$ 0
ALTERNATIVE	\$ 30,866	—	\$ 30,866
SAVINGS	\$ (30,866)	—	\$ (30,866)

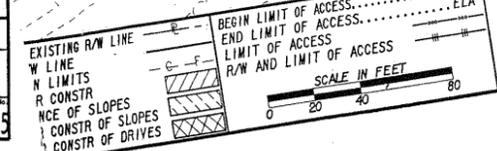


**THE LPA GROUP**  
 TRANSPORTATION CONSULTANTS  
 3584 ENGINEERING DRIVE  
 NORCROSS, GEORGIA 30092  
 (770) 285-9108

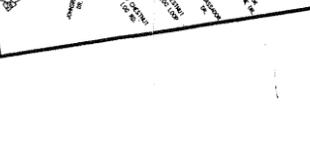


STATE OF GEORGIA  
 DEPARTMENT OF TRANSPORTATION  
 OFFICE OF CONSULTANT DESIGN  
**MAINLINE ROADWAY PLAN**  
 STA. 91+00 TO STA. 97+00  
 13-15

REVISION DATES



**THE LPA GROUP**  
 TRANSPORTATION CONSULTANTS  
 3584 ENGINEERING DRIVE  
 NORCROSS, GEORGIA 30092  
 (770) 285-9108



REVISION DATES

STATE OF GEORGIA  
 DEPARTMENT OF TRANSPORTATION  
 OFFICE OF CONSULTANT DESIGN  
**MAINLINE ROADWAY PLAN**  
 STA. 97+00 TO STA. 103+00  
 13-16

# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
Douglas County, Georgia Department of Transportation, District 7  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
PH2-6

SHEET NO.: 3 of 4

$$\begin{aligned} \text{Widening} - & 200' \times 12' \div 9 = 266.7 \text{ SY} \\ & (100' \times 12' \div 2 \div 9) \times 2 = 133.3 \text{ SY} \\ & \hline & 400 \text{ SY} \end{aligned}$$

R/W - Same as Pavement



# VALUE ENGINEERING ALTERNATIVE



PROJECT: MSL-0004-00(427) **LEE/SWEETWATER ROADS WIDENING PHASE 1**  
 MSL-0004-00(428) **CR 817/LEE ROAD WIDENING PHASE 2**  
 NHS-0001-00(917) **I-20/LEE ROAD INTERCHANGE RECONSTRUCTION**  
**Douglas County, Georgia Department of Transportation, District 7**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**PH2-9**

DESCRIPTION: **REALIGN THE DRIVEWAY TO THE MARVELOUS LIGHT  
 CHRISTIAN MINISTRIES PROPERTY**

SHEET NO.: **1 of 3**

**ORIGINAL DESIGN:**

The current design calls for the driveway to the Marvelous Light Christian Ministries property to tie directly into Lee Road south of the intersection of Lee Road and South County Line Road.

**ALTERNATIVE:**

Realign the Marvelous Light Christian Ministries property driveway to be part of the Lee Road/South County Line Road intersection.

**ADVANTAGES:**

- Improves turning movements into and out of the property
- Improves traffic flow
- Precludes side-by-side intersections

**DISADVANTAGES:**

- Increases initial cost

**DISCUSSION:**

Relocating the Marvelous Light Christian Ministries property's driveway to be part of the Lee Road/South County Line Road intersection allows for all traffic movements when entering and exiting the church. Not only will this alleviate potential backups onto the mainline, it will provide a safer crossing environment.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 0	—	\$ 0
ALTERNATIVE	\$ 27,397	—	\$ 27,397
SAVINGS	\$ (27,397)	—	\$ (27,397)

# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
Douglas County, Georgia Department of Transportation, District 7  
*Preliminary Design Stage*

ALTERNATIVE NO.:

PH2-9

SHEET NO.: 2 of 3

Driveway Relocation:

$$275' \times 20 \div 9 = 611.1 \text{ SY}$$

$$\text{Asphalt} - 611.1 \text{ SY} \times 6" \times 110\#/in - \text{SY} \div 2000 = 201.7 \text{ Tons}$$

$$\text{Base} - 611.1 \text{ SY} \times 8" \times 110\#/in - \text{SY} \div 2000 = 268.9 \text{ Tons}$$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: MSL-0004-00(427) LEE/SWEETWATER ROADS WIDENING PHASE 1  
 MSL-0004-00(428) CR 817/LEE ROAD WIDENING PHASE 2  
 NHS-0001-00(917) I-20/LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**PH2-10**

DESCRIPTION: **ELIMINATE THE MAXWELL PLACE/LEE ROAD INTERSECTION  
 AND DESIGNATE MAXWELL PLACE A CUL-DE-SAC**

SHEET NO.: **1 of 5**

**ORIGINAL DESIGN:** (Sketch attached)

The original design has Maxwell Place intersecting Lee Road at a 90° angle. There is no median opening at Maxwell Place, therefore, access is right-in, right-out only from southbound Lee Road.

**ALTERNATIVE:** (Sketch attached)

Eliminate the Maxwell Place/Lee Road intersection and make Maxwell Place a cul-de-sac.

**ADVANTAGES:**

- Improves safety
- Eliminates two side-by-side intersections
- Provides access to Lee Road via adjacent local streets
- Improves traffic flow
- Reduces initial cost

**DISADVANTAGES:**

- Requires alternate routes to access Lee Road

**DISCUSSION:**

Eliminating the Maxwell Place/Lee Road intersection improves both safety and traffic flow without major accessibility issues. As there is no median break at the Maxwell Place/Lee Road intersection, the design can only accommodate a right-in, right-out flow. With the cul-de-sac, residents could use Old Lee Road to access Lee Road or Maxwell Place to Fairburn Road.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 121,131	—	\$ 121,131
ALTERNATIVE	\$ 24,111	—	\$ 24,111
SAVINGS	\$ 97,020	—	\$ 97,020

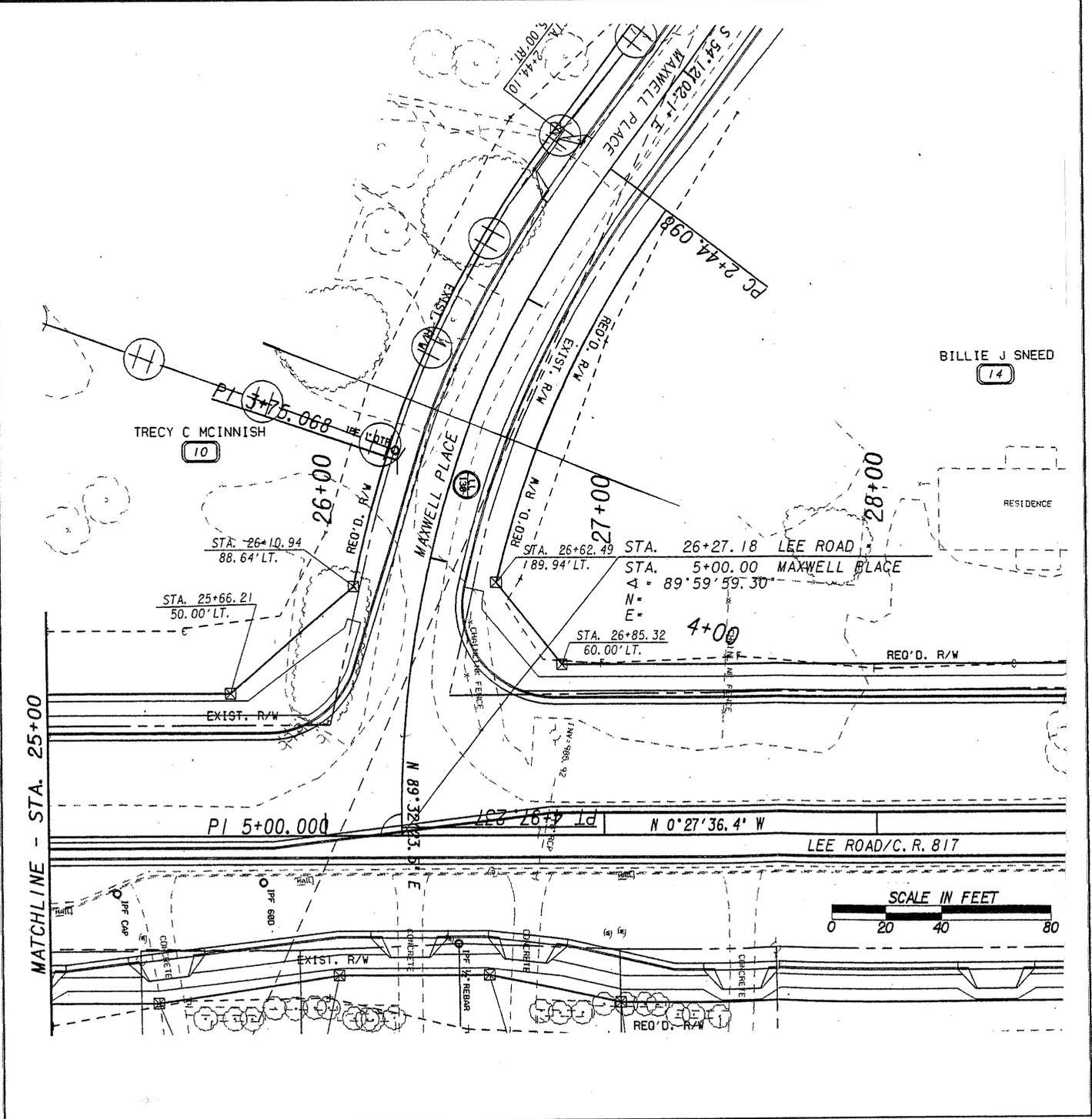
PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
 NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

ALTERNATIVE NO.:

PH2-10

AS DESIGNED     ALTERNATIVE

SHEET NO.: 2 of 5



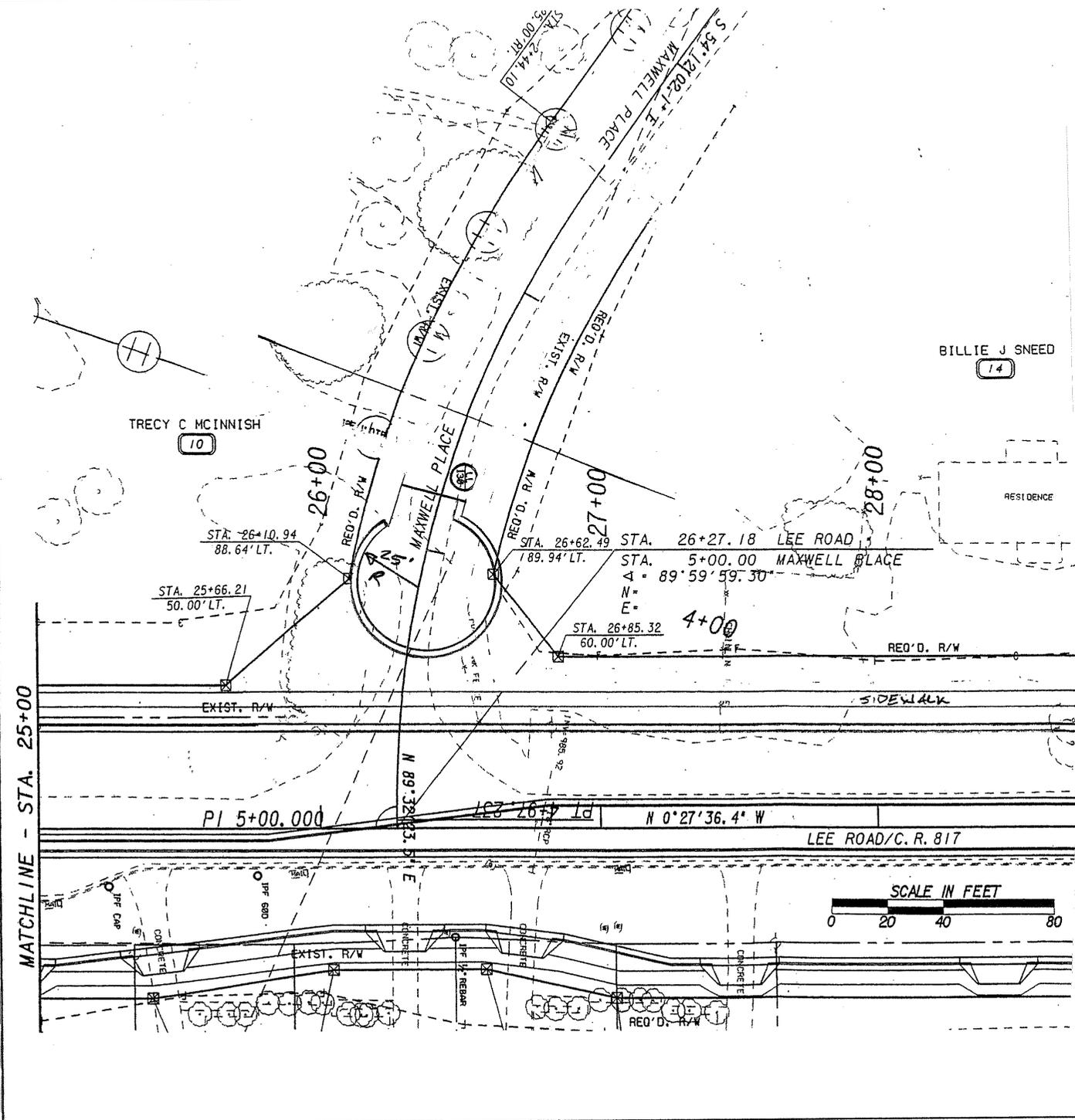
PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
 NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

ALTERNATIVE NO.:

PH2-10

AS DESIGNED     ALTERNATIVE

SHEET NO.: 3 of 5



# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
 NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

ALTERNATIVE NO.:

PH 2-10

SHEET NO.: 4 of 5

## ORIGINAL DESIGN

$$C \& G \quad 30(180)(\pi/180) + 280 + 220 = 594 \text{ LF}$$

$$\text{ASPHALT PAVEMENT} \left[ \left( \frac{70+25}{2} \right) (50) + 25(240) + 12(300) \right] / 9 = 1331 \text{ SY}$$

$$\text{CONC SW} \left[ .5(30)(40) + 13(40) \right] / 9 = 124 \text{ SY}$$

## ALTERNATIVE DESIGN

$$C \& G \quad = 100 \text{ LF}$$

$$\text{ASPHALT PAVEMENT} \left[ 10(24) + \pi(25^2) \right] / 9 = 245 \text{ SY}$$

$$\text{CONC SW} \quad 5(105) / 9 = 58 \text{ SY}$$





# SUMMARY OF POTENTIAL COST SAVINGS

PROJECT: MSL-0004-00(427) LEE/SWEETWATER ROADS WIDENING PHASE 1  
 MSL-0004-00(428) CR 817/LEE ROAD WIDENING PHASE 2  
 NHS-0001-00(917) I-20/LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

PRESENT WORTH OF COST SAVINGS

ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
PH2-11	Do not construct the "New Road"	\$174,087	\$0	\$174,087		\$174,087
	<b>PHASE 2 (PH2) CR 817/Lee Road Widening</b>					
PH2-12	Eliminate the Park Avenue/Lee Road intersection, extend Madison Place to the "New Road," and designate Park Avenue a cul-de-sac	\$64,655	\$35,160	\$29,495		\$29,495
	<b>Interchange Reconstruction (IR)</b>					
IR-1	Cul-de-sac Sweetwater Industrial Drive/Lee Road intersection	\$109,155	\$10,648	\$98,507		\$98,507
IR-2	Allow westbound Monier Boulevard traffic to turn southbound onto Lee Road	\$6,259	\$10,539	(\$4,280)		(\$4,280)
IR-4	Replace the multi-use trail on the east side of Lee Road with a sidewalk	\$615,169	\$521,345	\$93,824	\$66,317	\$160,141
IR-6	Extend the concrete pavement to Monier Boulevard	\$220,375	\$300,667	(\$80,292)	\$197,856	\$117,564
IR-7	Eliminate the sidewalks on the bridge and provide a multi-use trail	\$615,169	\$706,988	(\$91,819)		(\$91,819)
IR-8	Adjust the cost estimate to more accurately reflect the cost of the new bridge	\$3,650,201	\$5,054,125	(\$1,403,924)		(\$1,403,924)
IR-9	Provide access to Brodick Hill Apartments from Vulcan Drive	\$0	\$269,542	(\$269,542)		(\$269,542)

# VALUE ENGINEERING ALTERNATIVE



PROJECT: MSL-0004-00(427) **LEE/SWEETWATER ROADS WIDENING PHASE 1**  
 MSL-0004-00(428) **CR 817/LEE ROAD WIDENING PHASE 2**  
 NHS-0001-00(917) **I-20/LEE ROAD INTERCHANGE RECONSTRUCTION**  
**Douglas County, Georgia Department of Transportation, District 7**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**PH2-11**

DESCRIPTION: **DO NOT CONSTRUCT THE “NEW ROAD”**

SHEET NO.: **1 of 4**

**ORIGINAL DESIGN:** (Sketch attached)

The proposed design includes the construction of a “New Road” to access the wooded area for future development.

**ALTERNATIVE:** (Sketch attached)

Eliminate the “New Road” construction from this contract and have the developer provide this access to Lee Road in the future.

**ADVANTAGES:**

- Improves safety
- Eliminates two side-by-side intersections
- Reduces initial cost
- Improves traffic flow

**DISADVANTAGES:**

- None apparent

**DISCUSSION:**

The current design indicates the “New Road” leading to a wooded tract of land with no apparent improvements. If the land is to be developed in the future, do not burden this project with the cost of an uncertain benefit; instead, have the future developer provide access to Lee Road. The costs associated with the “New Road” should be part of the development costs and passed onto the ultimate users, not the taxpayers.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 174,087	—	\$ 174,087
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS	\$ 174,087	—	\$ 174,087



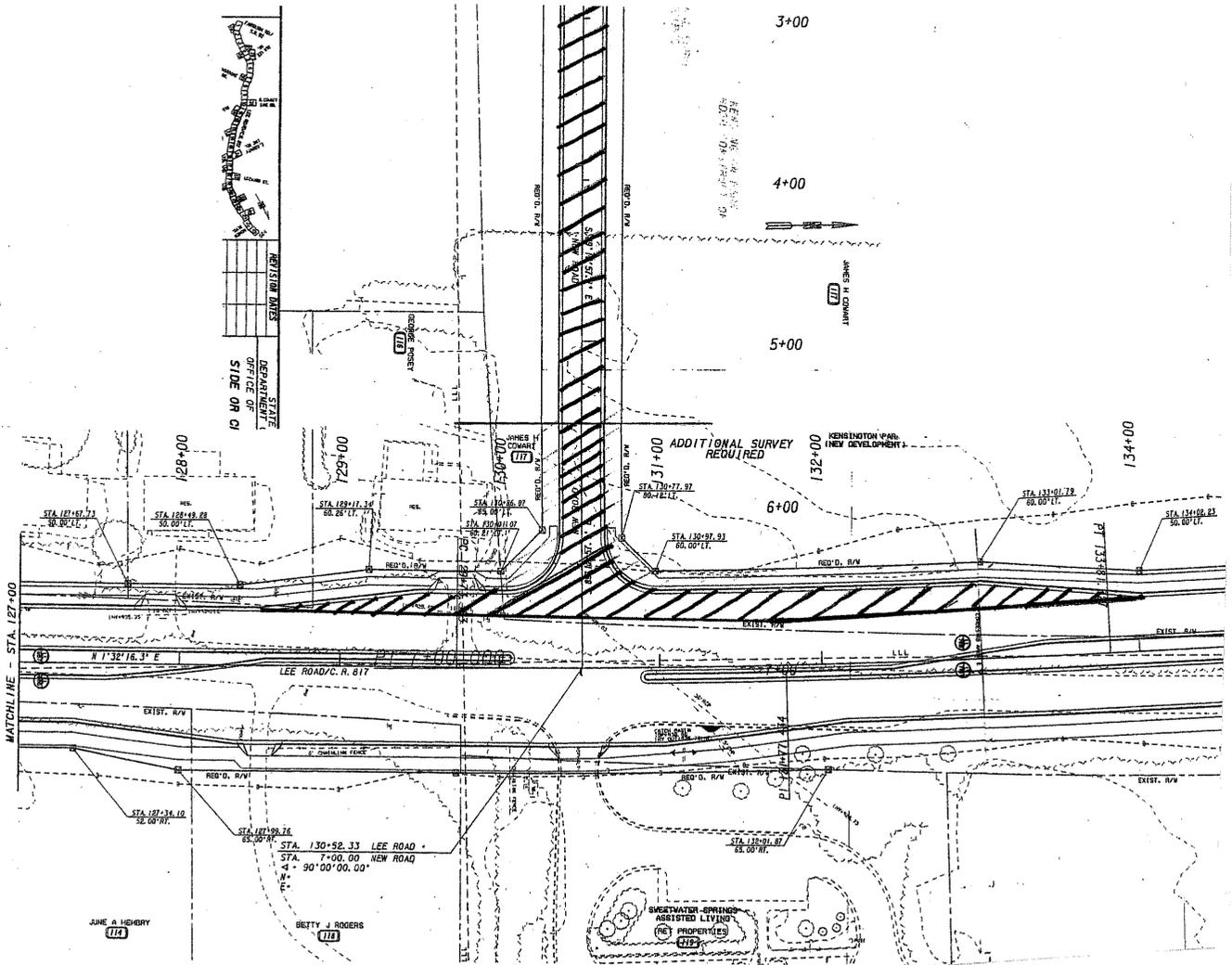
PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
 NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

ALTERNATIVE NO.:

PH2-11

AS DESIGNED       ALTERNATIVE

SHEET NO.: 2 of 4



# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
Douglas County, Georgia Department of Transportation, District 7  
*Preliminary Design Stage*

ALTERNATIVE NO.:

PH2-11

Do Not Construct "New Road"

SHEET NO.: 3 of 4

$$\text{Pavement - Lee Road: } (350' \times 12 \div 9) + (100 \times 12 \div 2 \div 9 \times 2) = 600 \text{ SF}$$

$$\text{New Road: } (471' \times 24' \div 9) = 1256 + 10 = 1266 \text{ SF}$$

$$\text{Curb + Gutter: } 471' \times 2 \times 2 \div 9 = 209.3 \text{ SF}$$

$$\text{R/w Reduction - Lee Road: } 600 \text{ SF} \times 9 = 5400 \text{ SF}$$

$$\text{New Road: } 471' \times 50' = 23550 + 90 = 23640 \text{ SF}$$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: MSL-0004-00(427) **LEE/SWEETWATER ROADS WIDENING PHASE 1**  
 MSL-0004-00(428) **CR 817/LEE ROAD WIDENING PHASE 2** NHS-0001-  
 00(917) **I-20/LEE ROAD INTERCHANGE RECONSTRUCTION**  
**Douglas County, Georgia Department of Transportation, District 7**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**PH2-12**

DESCRIPTION: **ELIMINATE THE PARK AVENUE/LEE ROAD INTERSECTION,  
 EXTEND MADISON PLACE TO THE “NEW ROAD,” AND  
 DESIGNATE PARK AVENUE A CUL-DE-SAC**

SHEET NO.: **1 of 3**

**ORIGINAL DESIGN:**

The original design has Park Avenue intersecting with Lee Road at a 90° angle. There is no median opening at Park Avenue, therefore, access is right-in, right-out only from southbound Lee Road.

**ALTERNATIVE:**

Provide access to Lee Road by extending the subdivision’s Madison Place to intersect with the proposed “New Road” and make Park Avenue a cul-de-sac. Eliminate the Park Avenue/Lee Road intersection.

**ADVANTAGES:**

- Improves safety
- Eliminates two side-by-side intersections
- Provides access to Lee Road via adjacent local streets
- Improves traffic flow

**DISADVANTAGES:**

- Increases initial cost
- Creates additional traffic flow on Madison Place

**DISCUSSION:**

Eliminating the Park Avenue/Lee Road intersections improves both safety and traffic flow without major accessibility issues. As there is no median break at the Park Avenue/Lee Road intersection, the design can only accommodate a right-in, right-out flow. With the cul-de-sac, residents could use an extended Madison Place to access the “New Road” and thus reach Lee Road after a short driving distance.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 64,655	—	\$ 64,655
ALTERNATIVE	\$ 35,160	—	\$ 35,160
SAVINGS	\$ 29,495	—	\$ 29,495

# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
Douglas County, Georgia Department of Transportation, District 7  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
PH2-12

Construct Cud-de-Sac at Park Ave & Extend Madison Pl. to Hwy Rd. SHEET NO.: 2 of 3

$$\text{Asphalt Pavement: Lee Rd} = \frac{466.7}{350' \times 12 \div 9} + \frac{133.3}{100 \times 12 \div 2 \div 9 \times 2} = 600 \text{ SY}$$

$$\text{Park Ave} = 183.5' \times 24' \div 9 = 489.3 \text{ SY}$$

$$\text{Madison Pl.} = 75' \times 24' \div 9 = (200 \text{ SY})$$

$$\text{Cud-de-Sac} = \pi \times 30^2 \div 9 = (314 \text{ SY})$$

Reduce by 575.3 SY

$$\text{Curb + Gutter} = 183.5' \times 2 \times 2 \div 9 = \underline{81.6 \text{ SY}}$$



# VALUE ENGINEERING ALTERNATIVE



PROJECT: MSL-0004-00(427) **LEE/SWEETWATER ROADS WIDENING PHASE 1**  
 MSL-0004-00(428) **CR 817/LEE ROAD WIDENING PHASE 2**  
 NHS-0001-00(917) **I-20/LEE ROAD INTERCHANGE RECONSTRUCTION**  
**Douglas County, Georgia Department of Transportation, District 7**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**IR-1**

DESCRIPTION: **CUL-DE-SAC SWEETWATER INDUSTRIAL DRIVE/LEE ROAD INTERSECTION**

SHEET NO.: **1 of 6**

**ORIGINAL DESIGN:** (Sketch attached)

The proposed design maintains the existing connection to Sweetwater Industrial Boulevard. An additional connection is provided via the extension of Vulcan Drive.

**ALTERNATIVE:** (Sketch attached)

Close Sweetwater Industrial Boulevard just west of the existing gasoline station entrance. All traffic would use the Vulcan Drive extension to reach Lee Road.

**ADVANTAGES:**

- Eliminates side-by-side intersections on Lee Road
- Improves safety
- Improves traffic flow
- Maintains business access to gasoline station

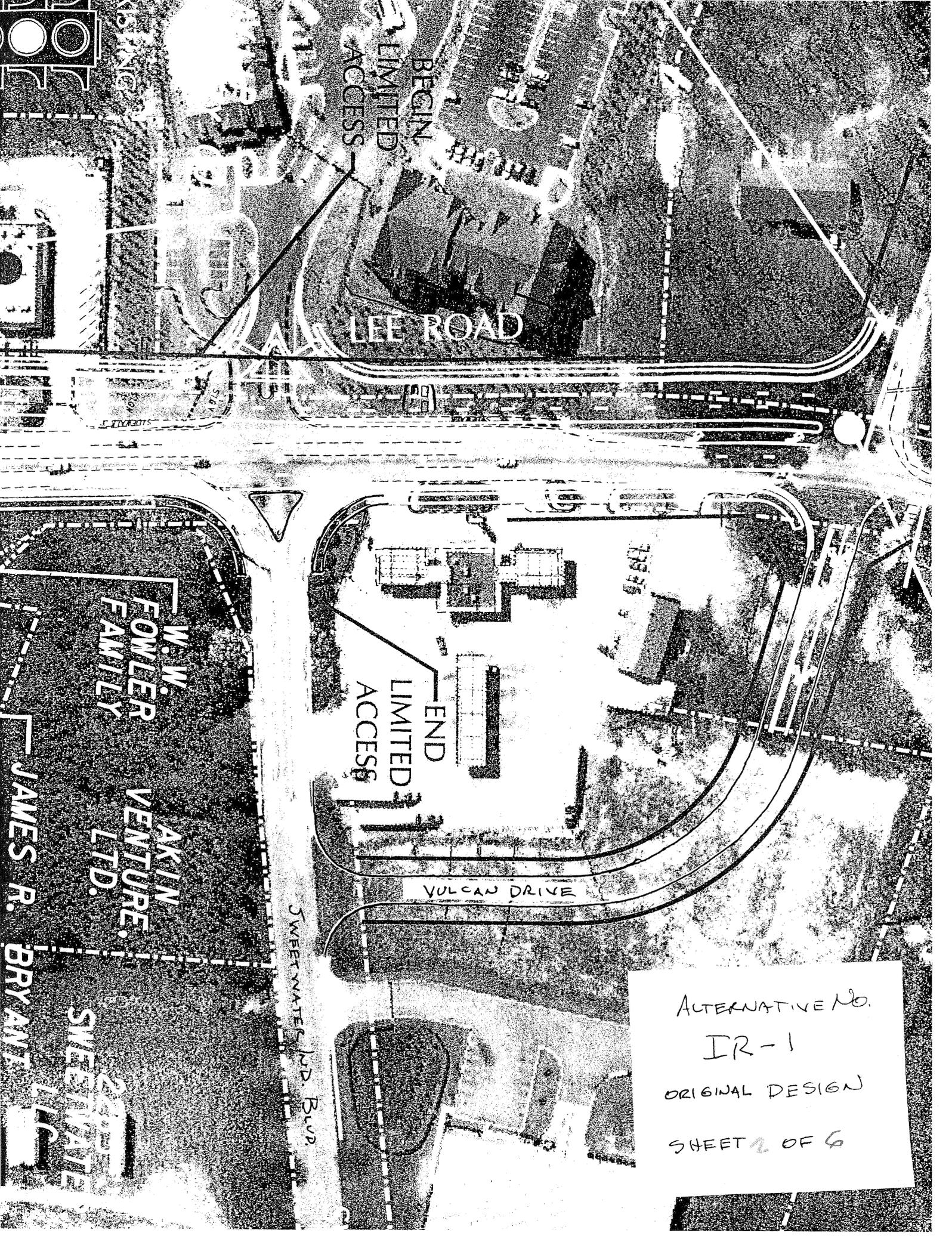
**DISADVANTAGES:**

- Slight increases travel distance to reach Lee Road and I-20

**DISCUSSION:**

The original design allows for right-in from and right-out to Lee Road from Sweetwater Industrial Boulevard. Traffic going to I-20 must use the Vulcan Drive extension, then turn left onto Lee Road. Additionally, the existing intersection is only about 350 ft. from the I-20 westbound ramps.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 109,155	—	\$ 109,155
ALTERNATIVE	\$ 10,648	—	\$ 10,648
SAVINGS	\$ 98,507	—	\$ 98,507



BEGIN LIMITED ACCESS

LEE ROAD

END LIMITED ACCESS

VULCAN DRIVE

SWEETWATER BLVD. BLVD.

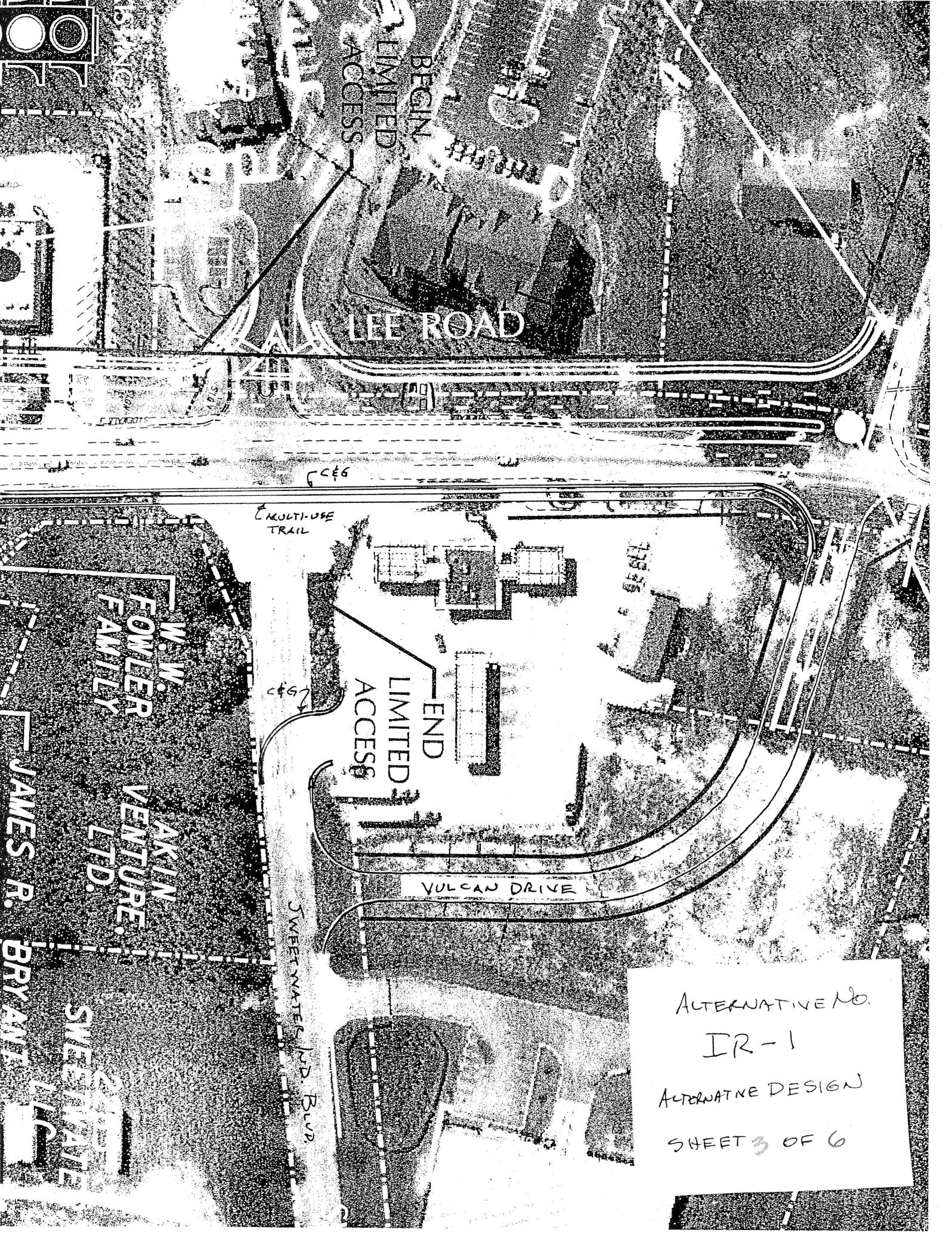
W. W. FOWLER FAMILY

AK IN VENTURE LTD.

JAMES R. BRYANT

SWEETWATER LLC

ALTERNATIVE NO. IR-1 ORIGINAL DESIGN SHEET 2 OF 6



LEE ROAD

END LIMITED ACCESS

VULCAN DRIVE

MULTI-USE TRAIL

W.W. AKIN FOWLER FAMILY LTD.

JAMES R. BRYANT LLC

SWEETWATER LLC

SWEETWATER RD BUMP

ALTERNATIVE No. IR-1  
ALTERNATIVE DESIGN  
SHEET 3 OF 6

# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
 NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

ALTERNATIVE NO.:

IR-1

SHEET NO.: 4 of 6

## ORIGINAL DESIGN

C & G (70' RAD.)

$$L = 70(180)(\pi/180) = 220 \text{ LF}$$

MULTI-USE TRAIL  $220(8)/9 = 196 \text{ SY}$

CONCRETE PAVING  $(\frac{150+50}{2})(70)/9 = 801 \text{ SY}$

ASPHALT PAVING  $120(44)/9 = 587 \text{ SY}$

4" MEDIAN  $.5(50)(40)/9 = 111 \text{ SY}$

## ALTERNATIVE DESIGN

C & G  $200 + 50(90)(\pi/180) + 2(25)(90)(\pi/180) = 357 \text{ LF}$

MULTI-USE TRAIL  $200(8)/9 = 178 \text{ SY}$

CONCRETE PAVING = 0

ASPHALT PAVING = 0

4" MEDIAN = 0

# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
 NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

ALTERNATIVE NO.:

IR-1

SHEET NO.: 5 of 6

COST PER SQ YD FOR ASPHALT PAVING  
 INCLUDING AGG. BASE, BASE, BINDER,  
 AND SURFACE

$$\text{AGG. BASE } 12'' (3)(3)(150\#/CF)/12 = 1350\#/SY$$

$$\text{BASE } 4'' (3)(3)(150\#/CF)/12 = 450\#/SY$$

$$\text{BINDER } 2'' (3)(3)(150\#/CF)/12 = 225\#/SY$$

$$\text{SURFACE } 1.5'' (3)(3)(150\#/CF)/12 = 169\#/SY$$

$$\begin{aligned} \text{COST} &= 1350 \left( \frac{\$20}{2000} \right) + (450 + 225 + 169) \left( \frac{\$75}{2000} \right) \\ &= \$13.50 + \$31.65 = \$45.15/SY \end{aligned}$$

# COST WORKSHEET



PROJECT: MSL-0004-00(427) LEE / SWEETWATER RDs WIDENING PH 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PH 2,  
 NHS-0001-00(917) I-20 / LEE ROAD I.C. RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, Dist. 7  
*Preliminary Design Stage*

ALTERNATIVE NO:  
**IR-1**

SHEET NO.: 6 of 6

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
Curb & Gutter	LF	220	13.45	2,959	357	13.45	4,802
Multi-Use Trail	SY	196	20.00	3,920	178	20.00	3,560
Concrete Pavement	SY	801	61.60	49,342			
Asphalt Pavement	SY	587	45.15	26,503			
4" Median	SY	111	27.00	2,997			
<i>Note: See Calculation Sheet 5 of 6 of Alternative IR-1 for asphalt pavement unit cost derivation.</i>							
<b>Sub-total</b>				85,720			8,362
<b>Mark-up at</b>	<b>27.34%</b>			23,436			2,286
<b>TOTAL</b>				<b>109,155</b>			<b>10,648</b>

# VALUE ENGINEERING ALTERNATIVE



PROJECT: MSL-0004-00(427) **LEE/SWEETWATER ROADS WIDENING PHASE 1**  
 MSL-0004-00(428) **CR 817/LEE ROAD WIDENING PHASE 2**  
 NHS-0001-00(917) **I-20/LEE ROAD INTERCHANGE RECONSTRUCTION**  
**Douglas County, Georgia Department of Transportation, District 7**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**IR-2**

DESCRIPTION: **ALLOW WESTBOUND MONIER BOULEVARD TRAFFIC TO  
 TURN SOUTHBOUND ONTO LEE ROAD**

SHEET NO.: **1 of 3**

**ORIGINAL DESIGN:**

The proposed design calls for a left turn onto Monier Boulevard from Lee Road but a right turn only from Monier Boulevard onto Lee Road.

**ALTERNATIVE:**

Adjust the median to allow left turns, i.e., southbound movements, from Monier Boulevard to Lee Road.

**ADVANTAGES:**

- Permits all traffic movements
- Improves traffic flow
- Less restrictive

**DISADVANTAGES:**

- Increases initial cost
- Increases queuing on Monier Boulevard
- Slight reduction in safety due to another turning movement

**DISCUSSION:**

Drivers expect to be able to make a southbound turn from Monier Boulevard onto Lee Road though the proposed design does not permit this movement. Although a slight increase in initial cost is incurred, the benefits outweigh the increase.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 6,259	—	\$ 6,259
ALTERNATIVE	\$ 10,539	—	\$ 10,539
SAVINGS	\$ (4,280)	—	\$ (4,280)

# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
Douglas County, Georgia Department of Transportation, District 7  
*Preliminary Design Stage*

ALTERNATIVE NO.:

IR-2

Allow Left Turn from Monier Blvd.

SHEET NO.: 2 of 3

Conc. Median - Lee Rd -  $40' \times 20' \div 9 = 133.3 \text{ SY}$

Monier Blvd -  $60' \times 15' \div 2 \div 9 = 50 \text{ SY}$

183.3 SY

Asphalt Pav't - Same as Conc. Median - 183.3 SY

# COST WORKSHEET



PROJECT:	MSL-0004-00(427) LEE / SWEETWATER RDs WIDENING PH 1, MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PH 2, NHS-0001-00(917) I-20 / LEE ROAD I.C. RECONSTRUCTION Douglas County, Georgia Department of Transportation, Dist. 7 <i>Preliminary Design Stage</i>	ALTERNATIVE NO: <h2 style="margin: 0;">IR-2</h2>
		SHEET NO.: 3 of 3

CONSTRUCTION ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/UNIT	TOTAL	NO. OF UNITS	COST/UNIT	TOTAL
Concrete Median	SY	183.3	26.82	4,916			
Asphalt Pavement	SY				183.3	45.15	8,276
<i>Note: See Calculation Sheet 5 of 6 of Alternative IR-1 for asphalt pavement unit cost derivation.</i>							
	<b>Sub-total</b>			4,915			8,276
<b>Mark-up at</b>	<b>27.34%</b>			1,344			2,263
	<b>TOTAL</b>			6,259			10,539

# VALUE ENGINEERING ALTERNATIVE



PROJECT: MSL-0004-00(427) LEE/SWEETWATER ROADS WIDENING PHASE 1  
 MSL-0004-00(428) CR 817/LEE ROAD WIDENING PHASE 2  
 NHS-0001-00(917) I-20/LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**IR-4**

DESCRIPTION: **REPLACE THE MUTI-USE TRAIL ON THE EAST SIDE OF LEE ROAD WITH A SIDEWALK**

SHEET NO.: **1 of 5**

**ORIGINAL DESIGN:**

The current design calls for the use of a 5-ft. concrete sidewalk on the west side of Lee Road and an 8-ft. asphalt multi-use trail on the east side. This configuration runs from Monier Boulevard north across the bridge over I-20 and ends at Vulcan Drive.

**ALTERNATIVE:**

Use 5-ft. concrete sidewalks on both sides of Lee Road and on the bridge over I-20 for the noted distance.

**ADVANTAGES:**

- Extends pavement life of the sidewalks
- Accelerates construction
- Potential decrease in temporary construction easement
- Symmetrical design/construction
- Reduces maintenance cost

**DISADVANTAGES:**

- Increases initial cost
- Decreases recreational value (for bicycling or other non-pedestrian mode of travel only)
- Loses amenity

**DISCUSSION:**

Off the bridge, the cost of the multi-use trail is less than the cost of sidewalks. On the bridge, the cost of the sidewalks is lower due to a reduced bridge deck area. The reduction of the bridge cost is greater than the increase in the cost of the sidewalks off the bridge, resulting in a net savings of approximately \$94,000.

The width of the right-of-way is not affected by either a 5-ft. sidewalk or an 8-ft. multi-use trail.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 615,169	\$ 126,650	\$ 741,819
ALTERNATIVE	\$ 521,345	\$ 60,333	\$ 581,678
SAVINGS	\$ 93,824	\$ 66,317	\$ 160,141

# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
Douglas County, Georgia Department of Transportation, District 7  
*Preliminary Design Stage*

ALTERNATIVE NO.:

IR-4

SHEET NO.: 2 of 5

Quantities (Original Design)

Sidewalk

$$\begin{array}{rcccl} 675\text{ft} & + & 1050\text{ft} & = & 1725\text{ft} \\ \swarrow & & \swarrow & & \\ \text{So of} & & \text{No. of} & & \\ \text{Bridge} & & \text{Bridge} & & \end{array}$$

Multivuse Trail

$$L = 1725\text{ft}$$

Bridge (Sidewalk Portion)

$$9.2\text{ft} \cdot 300\text{ft} = 2760\text{ft}^2$$

Bridge (Multivuse Trail Portion)

$$12.2\text{ft} \cdot 300\text{ft} = 3,660\text{ft}^2$$

Quantities (Alternate Design)

Sidewalk

$$L = 2 \cdot 1725\text{ft} = 3450\text{ft}$$

Multivuse Trail

$$L = \emptyset$$

Bridge (Sidewalk Portion)

$$2 \cdot 2760\text{ft}^2 = 5520\text{ft}^2$$

Bridge (Multivuse Trail Portion)

$$\emptyset$$

# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
 NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

ALTERNATIVE NO.:

PH1-6,  
 PH2-2,3  
IR-4 7

Unit Price for Sidewalk & Multiuse Path

SHEET NO.: 3 of 5

Right of Way requirements are not changed whether or not sidewalk & multiuse paths are constructed. Therefore the only unit cost to be developed will be construction cost.

Cost:

Sidewalk (5ft wide)

$$\text{PH2 } \$55/\text{SY} \cdot \frac{1\text{SY}}{9\text{ft}^2} \cdot 5\text{ft} = \$30.56/\text{ft} \text{ PH2}$$

PH1 \$60  
 IC \$26.41

$$= \$33.33/\text{ft} \text{ PH1}$$

$$= \$14.67/\text{ft} \text{ I.C.} \leftarrow$$

Multiuse Trail (8ft wide)

PH1 \$100/TN  
 PH2 \$92/TN  
 IC \$75/TN

Asphalt \$92/TN (4in)

Agg Base \$15/TN (8in)

110lb/sy Per In.

$$\text{Asphalt} = 110\frac{\text{lb}}{\text{sy}} \cdot 4 \cdot \frac{1\text{TN}}{2000\text{lb}} \cdot \frac{1\text{SY}}{9\text{ft}^2} \cdot 8\text{ft} \cdot \$92/\text{TN}$$

$$= \begin{matrix} \$18 \text{ PH2} \\ \$19.56 \text{ PH1} \\ \$14.67 \text{ IC} \end{matrix} / \text{ft} \leftarrow$$

PH1 \$15  
 PH2 \$15  
 IC \$20

$$\text{Agg Base} = 110\frac{\text{lb}}{\text{sy}} \cdot 8 \cdot \frac{1\text{TN}}{2000\text{lb}} \cdot \frac{1\text{SY}}{9\text{ft}^2} \cdot 9\text{ft} \cdot \$15/\text{TN}$$

$$= \begin{matrix} \$6.60 \text{ PH1} \\ \$6.60 \text{ PH2} \end{matrix} / \text{ft}$$

Multiuse Trail =

$$= \$26.16/\text{ft} \text{ PH1}$$

$$= \$24.60/\text{ft} \text{ PH2}$$

$$= \$23.47/\text{ft} \text{ IC} \leftarrow$$



# LIFE CYCLE COST WORKSHEET



PROJECT: MSL-0004-00(427) LEE / SWEETWATER RDs WIDENING PH 1, MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PH 2, NHS-0001-00(917) I-20 / LEE ROAD I.C. RECONSTRUCTION Douglas County, Georgia Department of Transportation, District 7 <i>Preliminary Design Stage</i>	ALTERNATIVE NO. <h2 style="margin: 0;">IR-4</h2> SHEET NO. 5 of 5
---	---

<b>LIFE CYCLE PERIOD:</b> <u>35</u> years							
<b>INTEREST RATE:</b> <u>2.50%</u> <b>ESCALATION RATE:</b> _____		<b>ORIGINAL</b>	<b>PROPOSED</b>				
<b>A. INITIAL COST</b>		615,169	521,345				
<b>Useful Life (Years)</b>							
<b>INITIAL COST SAVINGS</b>			93,824				
<b>B. RECURRENT COSTS (Annual Expenditures)</b>							
1.	Maintenance: Assume 0.5% of initial cost for yearly maintenance			3,076			
2.	Operating				2,607		
3.	Energy						
4.							
<b>Total Annual Costs</b>				3,076	2,607		
<i>(An effective rate of 2.50% with 0.00% Interest and 2.50% Escal.)</i> <b>Present Worth Factor</b>				23.1452	23.1452		
<b>Present Worth of RECURRENT COSTS</b>				71,191	60,333		
<b>C. SINGLE EXPENDITURES</b>							
ORIG	PROP	< Put "x" in appropriate box (original design or proposed design)	Year	Amount	PW factor	Present Worth	Present Worth
x		1. Resurfacing (See Calculation Sheet: \$5.50 / LF (for 1.5" thick wearing course) x 1,725 LF = \$9,488) + Markup at 27.34% = \$12,081	7	12,081	0.8413	10,163	-
x		2. Resurfacing (See above)	14	12,081	0.7077	8,550	-
x		3. Repaving (See Calculation Sheet: \$23.47 / LF (for 4" thick bearing course) x 1,725 LF = \$40,486) + Markup at 27.34% = \$51,555	21	51,555	0.5954	30,695	-
x		4. Resurfacing (See above)	28	12,081	0.5009	6,051	-
		5.			1.0000	-	-
<b>D. SALVAGE VALUE</b>			Year	Amount	PW factor	Present Worth	Present Worth
		1.			1.0000	-	-
		2.			1.0000	-	-
<b>Present Worth of SINGLE EXPENDITURES</b>						55,459	-
<b>E. Total Recurrent Costs &amp; Single Expenditures (B + C)</b>						126,650	60,333
<b>RECURRENT COSTS &amp; SINGLE EXPENDITURES SAVINGS</b>							66,317
<b>TOTAL PRESENT WORTH COST (A + D)</b>						741,819	581,678
<b>TOTAL LIFE CYCLE SAVINGS</b>							<b>160,141</b>

# VALUE ENGINEERING ALTERNATIVE



PROJECT: MSL-0004-00(427) **LEE/SWEETWATER ROADS WIDENING PHASE 1**  
 MSL-0004-00(428) **CR 817/LEE ROAD WIDENING PHASE 2**  
 NHS-0001-00(917) **I-20/LEE ROAD INTERCHANGE RECONSTRUCTION**  
**Douglas County, Georgia Department of Transportation, District 7**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**IR-6**

DESCRIPTION: **EXTEND CONCRETE PAVEMENT TO MONIER BOULEVARD**

SHEET NO.: **1 of 4**

**ORIGINAL DESIGN:**

The proposed design calls for the use of Portland cement concrete (PCC) pavement from Vulcan Drive to the eastbound I-20 ramps.

**ALTERNATIVE:**

Extend the PCC pavement from the eastbound I-20 lanes to Monier Boulevard.

**ADVANTAGES:**

- Extends pavement life
- Improves pavement reliability
- PCC better suited for intended heavy truck traffic
- Common practice in the current application
- Improves maintenance costs

**DISADVANTAGES:**

- Increases initial cost
- Slightly increases construction duration

**DISCUSSION:**

There is considerable heavy truck traffic to Monier Boulevard from I-20; as such, the more durable concrete pavement would require less maintenance.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 220,375	\$ 232,651	\$ 453,026
ALTERNATIVE	\$ 300,667	\$ 34,795	\$ 335,462
SAVINGS	\$ (80,292)	\$ 197,856	\$ 117,564

# CALCULATIONS



PROJECT: MSL-0004-00(427) **LEE / SWEETWATER ROADS WIDENING PHASE 1,**  
MSL-0004-00(428) **CR 817 / LEE ROAD WIDENING PHASE 2,**  
NHS-0001-00(917) **I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION**  
**Douglas County, Georgia Department of Transportation, District 7**  
*Preliminary Design Stage*

ALTERNATIVE NO.:

**IR-6**

SHEET NO.: 2 of 4

## PAVEMENT WIDTH:

SB two through lanes	2 x 12 LF	24 LF
NB two through lanes	2 x 12 LF	24 LF
One right turn lane to EB ramp	1 x 12 LF	<u>12 LF</u>
TOTAL		60 LF

Begin change at Station 148+75 and  
End change at Station 154+50.  
Total length = 15,450 LF – 14,875 LF = 575 LF

∴ Pavement area = 60LF x 575 LF = 34,500 SF  
34,500 SF ÷ 9 SF / SY = **3,833 SY.**

## CONCRETE PAVEMENT COSTS:

12" concrete pavement =	\$43.98 / SY
25mm Superpave (110#/in/SY) x (\$75.00/2,000#/ton) =	\$ 4.12 / SY
12" gravel aggregate base (1)(3)(3)(150)(\$20.00/2000#/ton) =	<u>\$13.50 / SY</u>
TOTAL	\$61.60 / SY



# LIFE CYCLE COST WORKSHEET



PROJECT: MSL-0004-00(427) LEE / SWEETWATER RDs WIDENING PH 1, MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PH 2, NHS-0001-00(917) I-20 / LEE ROAD I.C. RECONSTRUCTION Douglas County, Georgia Department of Transportation, District 7 <i>Preliminary Design Stage</i>	ALTERNATIVE NO. <h2 style="margin: 0;">IR-6</h2> SHEET NO. 4 of 4
---	--

LIFE CYCLE PERIOD: <u>35</u> years INTEREST RATE: <u>2.50%</u> ESCALATION RATE: _____	<b>ORIGINAL</b>	<b>PROPOSED</b>																																																															
<b>A. INITIAL COST</b>	220,375	300,667																																																															
Useful Life (Years)																																																																	
<b>INITIAL COST SAVINGS</b>		(80,292)																																																															
<b>B. RECURRENT COSTS (Annual Expenditures)</b>																																																																	
1. Maintenance: Assume 0.5% of initial cost for yearly maintenance	1,102																																																																
2. Operating		1,503																																																															
3. Energy																																																																	
4.																																																																	
5.																																																																	
6.																																																																	
<b>Total Annual Costs</b>	1,102	1,503																																																															
<i>(An effective rate of 2.50% with 0.00% Interest and 2.50% Escal.)</i> <b>Present Worth Factor</b>	23.1452	23.1452																																																															
<b>Present Worth of RECURRENT COSTS</b>	25,503	34,795																																																															
<b>C. SINGLE EXPENDITURES</b>																																																																	
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;"></th> <th style="width: 5%;">ORIG</th> <th style="width: 5%;">PROP</th> <th style="width: 45%;">&lt; Put "x" in appropriate box (original design or proposed design)</th> <th style="width: 10%;">Year</th> <th style="width: 10%;">Amount</th> <th style="width: 10%;">PW factor</th> <th style="width: 10%;">Present Worth</th> <th style="width: 10%;">Present Worth</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">x</td> <td></td> <td></td> <td>Resurfacing (1.5" x 110#/in/SY / 2000 x \$92.00/ton = \$7.59/SY) x 3,833 SY + Markup at 27.34% = \$37,046</td> <td style="text-align: center;">7</td> <td style="text-align: right;">37,046</td> <td style="text-align: center;">0.8413</td> <td style="text-align: right;">31,166</td> <td style="text-align: center;">-</td> </tr> <tr> <td style="text-align: center;">x</td> <td></td> <td></td> <td>Resurfacing (See above)</td> <td style="text-align: center;">14</td> <td style="text-align: right;">37,046</td> <td style="text-align: center;">0.7077</td> <td style="text-align: right;">26,218</td> <td style="text-align: center;">-</td> </tr> <tr> <td style="text-align: center;">x</td> <td></td> <td></td> <td>Repaving (same as initial cost)</td> <td style="text-align: center;">21</td> <td style="text-align: right;">220,375</td> <td style="text-align: center;">0.5954</td> <td style="text-align: right;">131,208</td> <td style="text-align: center;">-</td> </tr> <tr> <td style="text-align: center;">x</td> <td></td> <td></td> <td>Resurfacing (See above)</td> <td style="text-align: center;">28</td> <td style="text-align: right;">37,046</td> <td style="text-align: center;">0.5009</td> <td style="text-align: right;">18,556</td> <td style="text-align: center;">-</td> </tr> <tr> <td></td> <td></td> <td></td> <td>5.</td> <td></td> <td></td> <td style="text-align: center;">1.0000</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> </tr> <tr> <td></td> <td></td> <td></td> <td>6.</td> <td></td> <td></td> <td style="text-align: center;">1.0000</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> </tr> </tbody> </table>		ORIG	PROP	< Put "x" in appropriate box (original design or proposed design)	Year	Amount	PW factor	Present Worth	Present Worth	x			Resurfacing (1.5" x 110#/in/SY / 2000 x \$92.00/ton = \$7.59/SY) x 3,833 SY + Markup at 27.34% = \$37,046	7	37,046	0.8413	31,166	-	x			Resurfacing (See above)	14	37,046	0.7077	26,218	-	x			Repaving (same as initial cost)	21	220,375	0.5954	131,208	-	x			Resurfacing (See above)	28	37,046	0.5009	18,556	-				5.			1.0000	-	-				6.			1.0000	-	-		
	ORIG	PROP	< Put "x" in appropriate box (original design or proposed design)	Year	Amount	PW factor	Present Worth	Present Worth																																																									
x			Resurfacing (1.5" x 110#/in/SY / 2000 x \$92.00/ton = \$7.59/SY) x 3,833 SY + Markup at 27.34% = \$37,046	7	37,046	0.8413	31,166	-																																																									
x			Resurfacing (See above)	14	37,046	0.7077	26,218	-																																																									
x			Repaving (same as initial cost)	21	220,375	0.5954	131,208	-																																																									
x			Resurfacing (See above)	28	37,046	0.5009	18,556	-																																																									
			5.			1.0000	-	-																																																									
			6.			1.0000	-	-																																																									
<b>D. SALVAGE VALUE</b>																																																																	
1.		1.0000	-	-																																																													
2.		1.0000	-	-																																																													
<b>Present Worth of SINGLE EXPENDITURES</b>		207,148	-																																																														
<b>E. Total Recurrent Costs &amp; Single Expenditures (B + C)</b>		232,651	34,795																																																														
<b>RECURRENT COSTS &amp; SINGLE EXPENDITURES SAVINGS</b>			197,856																																																														
<b>TOTAL PRESENT WORTH COST (A + D)</b>		453,026	335,462																																																														
<b>TOTAL LIFE CYCLE SAVINGS</b>			<b>117,564</b>																																																														

# VALUE ENGINEERING ALTERNATIVE



PROJECT: MSL-0004-00(427) LEE/SWEETWATER ROADS WIDENING PHASE 1  
 MSL-0004-00(428) CR 817/LEE ROAD WIDENING PHASE 2  
 NHS-0001-00(917) I-20/LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**IR-7**

DESCRIPTION: **PROVIDE A MULTI-USE TRAIL AND ELIMINATE SIDEWALKS  
 ON THE BRIDGE**

SHEET NO.: **1 of 4**

**ORIGINAL DESIGN:**

The proposed design calls for the use of a 5-ft. concrete sidewalk on the west side of Lee Road and an 8-ft. asphalt multi-use trail on the east side. This configuration runs from Monier Boulevard north across the bridge over I-20 and ends at Vulcan Drive.

**ALTERNATIVE:**

Eliminate the 5-ft. concrete sidewalk on the west side of Lee Road and on the bridge over I-20 for the noted distance, and retain the multi-use trail.

It is noted that without the sidewalk on the west side of the bridge, GDOT standards require a 10-ft. shoulder on that side of the bridge, making the edge of the bridge 11.625 ft. for the edge of the travel lane.

**ADVANTAGES:**

- Maintains recreational value/access
- Accelerates construction

**DISADVANTAGES:**

- Increases initial cost
- Provides pedestrian traffic on one side of the bridge only
- Loses amenity

**DISCUSSION:**

Off the bridge, the per-ft. cost of sidewalk is actually higher than the multi-use trail cost. With the GDOT requirement noted above, the bridge would actually be wider under this alternative.

Should GDOT desire to relax its 10-ft. bridge shoulder requirement, some savings may be possible.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 615,169	—	\$ 615,169
ALTERNATIVE	\$ 706,988	—	\$ 706,988
SAVINGS	\$ (91,819)	—	\$ (91,819)

# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
 NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

ALTERNATIVE NO.:

IR-7

SHEET NO.: 2 of 4

## Quantities (Original Design)

Sidewalk

$$675\text{ft} + 1050\text{ft} = 1725\text{ft}$$

↳ So of Bridge
↳ No. of Bridge

Multivuse Trail

$$L = 1725\text{ft}$$

Bridge (Sidewalk Portion)

$$9.2\text{ft} \cdot 300\text{ft} = 2760\text{ft}^2$$

Bridge (Multivuse Trail Portion)

$$12.2\text{ft} \cdot 300\text{ft} = 3660\text{ft}^2$$

## Quantities (Alternate Design)

Sidewalk

$$L = \emptyset$$

Multivuse Trail

$$L = 1725\text{ft}$$

Bridge

$$11.6\text{ft} \cdot 300\text{ft} = 3480\text{ft}^2$$

Bridge (Multivuse Trail Portion)

$$3660\text{ft}^2$$

# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
 MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
 NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
 Preliminary Design Stage

ALTERNATIVE NO.:

PH1-6,  
 PH2-2,3  
 IR-4,7

Unit Price for Sidewalk & Multiuse Path

SHEET NO.: 3 of 4

Right of Way requirements are not changed whether or not sidewalk & multiuse paths are constructed. Therefore the only unit cost to be developed will be construction cost.

Cost:

**Sidewalk** (5ft wide)

$$\begin{matrix} \text{PH2} & \$55/\text{SY} \\ \text{PH1} & \$60 \\ \text{IC} & \$26.41 \end{matrix} \cdot \frac{1\text{SY}}{9\text{ft}^2} \cdot 5\text{ft} =$$

\$30.56/ft	PH2
\$33.33/ft	PH1
\$14.67/ft	I.C.

Multiuse Trail (8ft wide)

PH1 \$100/TN  
 PH2 \$92/TN  
 IC \$75/TN

Asphalt \$92/TN (4in)  
 Agg Base \$15/TN (8in)

110lb/sy Per In.

$$\text{Asphalt} = 110 \frac{\text{lb}}{\text{sy}} \cdot 4 \cdot \frac{1\text{TN}}{2000\text{lb}} \cdot \frac{1\text{SY}}{9\text{ft}^2} \cdot 8\text{ft} \cdot \$92/\text{TN}$$

$$= \$19.56/\text{ft} \left( \begin{matrix} \$18 \text{ PH2} \\ \$1.56 \text{ PH1} \end{matrix} \right)$$

PH1 \$15  
 PH2 \$15  
 IC \$20

$$\text{Agg Base} = 110 \frac{\text{lb}}{\text{sy}} \cdot 8 \cdot \frac{1\text{TN}}{2000\text{lb}} \cdot \frac{1\text{SY}}{9\text{ft}^2} \cdot 9\text{ft} \cdot \$15/\text{TN}$$

$$= \$8.80/\text{ft} \left( \begin{matrix} \$6.60 \text{ PH1} \\ \$2.20 \text{ PH2} \end{matrix} \right)$$

Multiuse Trail =	\$26.16/ft	PH1
	\$24.60/ft	PH2
	\$23.47/ft	I.C.



# VALUE ENGINEERING ALTERNATIVE



PROJECT: MSL-0004-00(427) LEE/SWEETWATER ROADS WIDENING PHASE 1  
 MSL-0004-00(428) CR 817/LEE ROAD WIDENING PHASE 2  
 NHS-0001-00(917) I-20/LEE ROAD INTERCHANGE RECONSTRUCTION  
 Douglas County, Georgia Department of Transportation, District 7  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**IR-8**

DESCRIPTION: **ADJUST THE COST ESTIMATE TO MORE ACCURATELY  
 REFLECT THE COST OF THE NEW BRIDGE**

SHEET NO.: **1 of 2**

**ORIGINAL DESIGN:**

The cost estimate for the new bridge over I-20 indicates a cost of \$65 per SF.

**ALTERNATIVE:**

Adjust the cost estimate to reflect the current bridge cost noted in the GDOT Bridge and Structures Policy Manual of \$90 per SF.

**ADVANTAGES:**

- Provides a more realistic unit price
- Precludes “sticker shock” at bid opening
- Reflects today’s prices

**DISADVANTAGES:**

- Increases initial cost

**DISCUSSION:**

Acknowledging that the bridge design is only at the concept stage, steps might be taken to help lower the cost of the bridge when comparing actual costs to the current estimate. The magnitude of increase warrants further investigation by GDOT and the design team.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 3,650,201	—	\$ 3,650,201
ALTERNATIVE	\$ 5,054,125	—	\$ 5,054,125
SAVINGS	\$ (1,403,924)	—	\$ (1,403,924)



# VALUE ENGINEERING ALTERNATIVE



PROJECT: MSL-0004-00(427) **LEE/SWEETWATER ROADS WIDENING PHASE 1**  
 MSL-0004-00(428) **CR 817/LEE ROAD WIDENING PHASE 2**  
 NHS-0001-00(917) **I-20/LEE ROAD INTERCHANGE RECONSTRUCTION**  
**Douglas County, Georgia Department of Transportation, District 7**  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
**IR-9**

DESCRIPTION: **PROVIDE ACCESS TO BRODICK HILL APARTMENTS FROM  
 VULCAN DRIVE**

SHEET NO.: **1 of 4**

**ORIGINAL DESIGN:** (Sketch attached)

The original design indicates a right-in/right-out only entrance at the Brodick Hill Apartments.

**ALTERNATIVE:** (Sketch attached)

Provide access from the Brodick Hill Apartments onto Vulcan Drive to access Lee Road and Sweetwater Industrial Boulevard.

**ADVANTAGES:**

- Eliminates three intersections in a row on Lee Road and bridge ramps
- Improves safety
- Improves traffic flow
- Maintains business access

**DISADVANTAGES:**

- Increases initial cost
- Requires additional right-of-way

**DISCUSSION:**

The current design precludes residents from accessing Vulcan Drive or Sweetwater Industrial Boulevard without traveling some distance on Lee Road and making a legal U-turn, then retracing their travel to make the traffic movements. This alternative alleviates this situation and allows better access onto Lee Road for the apartment residents, albeit at a substantial cost increase.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 0	—	\$ 0
ALTERNATIVE	\$ 269,542	—	\$ 269,542
SAVINGS	\$ (269,542)	—	\$ (269,542)

# SKETCHES



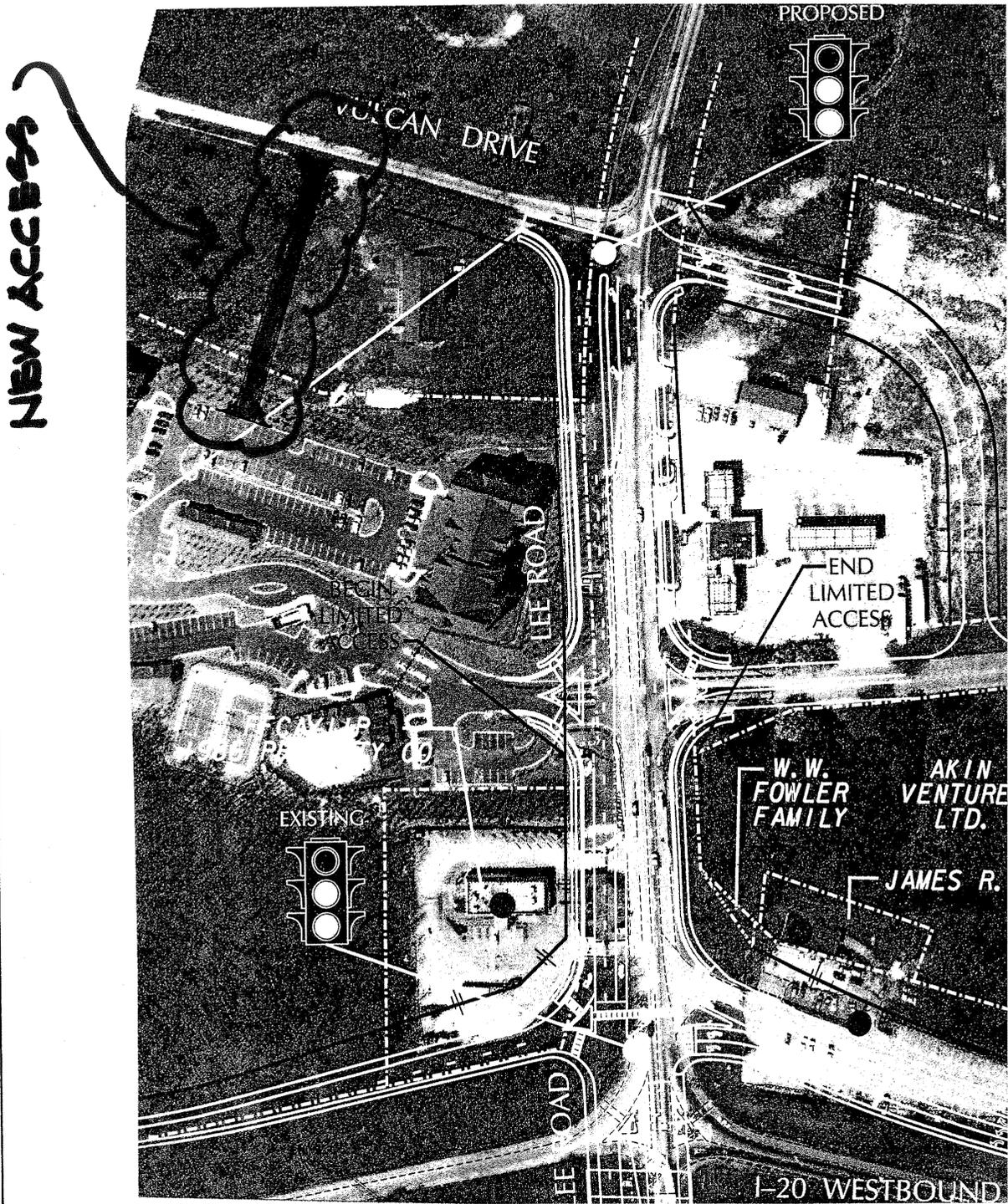
PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
Douglas County, Georgia Department of Transportation, District 7  
*Preliminary Design Stage*

ALTERNATIVE NO.:

IR-9

AS DESIGNED     ALTERNATIVE

SHEET NO.: 2 of 4



# CALCULATIONS



PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,  
MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION  
Douglas County, Georgia Department of Transportation, District 7  
*Preliminary Design Stage*

ALTERNATIVE NO.:  
IR-9

SHEET NO.: 3 of 4

Asphalt Pav't -  $300' \times 24' \div 9 = 800.54$

Curb & Gutter -  $300' \times 2 = 600 \text{ LF}$

18" Storm Drain - 350 LF



---

---

## **PROJECT DESCRIPTION**

---

---

### **BACKGROUND**

The Atlanta Regional Commission (ARC) adopted a new Transportation Improvement Plan (TIP) for the 13-county Atlanta metropolitan area in 2005. The Plan addresses travel needs through the year 2030. The Regional Transportation Plan (RTP) and TIP are the direct result of a comprehensive, cooperative, and continuous planning process conducted by ARC, local governments, the Georgia Regional Transportation Authority (GRTA) and the Georgia Department of Transportation (GDOT) in cooperation with the Federal Highway and Federal Transit Administrations.

The aforementioned RTP and TIP recommend a capacity addition on Lee Road/South Sweetwater Road from US Route (US) 78/State Route (SR) 5/SR 8/Bankhead Highway to Interstate Highway 20 (I-20) West. Lee Road and South Sweetwater Road were identified in the ARC Congestion Management System as congested roadways with heavy peak period volumes. The Lee Road project known as Lee Road/Sweetwater Road Widening – Phase 1 [MSL-0004-00(427), P. I. No. 0004427], is included and listed as in the 2005-2010 TIP as number DO-022. The other Lee Road project known as County Road (CR) 817/Lee Road Widening – Phase 2 [MSL-0004-00(428), P. I. No. 0004428] is listed and is in the 2003-2005 TIP as number DO-220A. Finally, the connecting project between these two Lee Road projects is known as U.S. Interstate Highway 20 (I-20)/Lee Road Interchange Reconstruction and Widening of Lee Road [NHS-0001-00(917), P. I. No. 0001917], as listed in the 2005-2007 TIP as DO-220B.

### **LEE ROAD/SWEETWATER ROAD WIDENING – PHASE 1, MSL-0004-00(427), P. I. NO. 0004427**

#### **Design**

The purpose of project MSL-0004-00(427) is to widen Lee Road and South Sweetwater Road from US 78/SR 5/SR 8/Bankhead Highway to Vulcan Drive, just north of the I-20 interchange, to provide greater mobility in the area. The sections of Lee Road and South Sweetwater Road within the project description are currently two lanes and are classified as urban minor arterials in Douglas County. At the southern limit of the project, Lee Road connects to I-20 at exit 41. At this interchange is a 145-space park and ride lot which is used by Douglas County vanpool and other local residents. The Lee Road interchange with I-20 provides interstate access to eastern Douglas County in the Lithia Springs area, and also connects to the eastern limits of Douglasville.

The project is planned as a widening from a two-lane to a four-lane divided roadway from Vulcan Drive to Skyview Drive and a two-lane roadway with a center lane providing a two-way left-turn lane from Skyview Drive to US 78/SR 5/SR 8/Bankhead Highway. Median openings will be placed at major intersections in accordance with GDOT policy. Major intersections on the South Sweetwater Road portion are at US 78/Bankhead Highway, Skyview Drive, and Lee Road and on the Lee Road portion at Vulcan Drive. A realignment of Lee Road/South Sweetwater Road is proposed to facilitate better north-south traffic movement between Lee Road and South Sweetwater Road. Currently, Lee Road joins Sweetwater Road at a T-intersection. The realignment would improve operations and safety and provide a direct connection between Lee Road and South Sweetwater Road by having Sweetwater Road cross-

intersect with Lee Road. There are no major bridges within the project limits. Very limited sidewalks currently exist along Lee Road/South Sweetwater Road. The project will include a sidewalk on one side of the street and a multi-use trail on the other. State Bike Route 15 is within the project limits from the Lee Road/South Sweetwater intersection to US 78/Bankhead Highway. The Douglas County Bike-Pedestrian Plan also proposes a multi-use trail within the project limits from Vulcan Drive to the Lee Road/South Sweetwater intersection.

The project requires coordination with a number of other planned projects. Regionally, high occupancy vehicle (HOV) lanes are programmed on I-20 West from SR 6/Thornton Road to SR-5/Bill Arp Road. The Lee Road Bridge at I-20 West is programmed for capacity addition as is Lee Road from I-20 West to SR 92-Fairburn Road. On the northern end of the project where South Sweetwater Road intersects US 78/SR 5/ SR 8/Bankhead Highway, US 78 has two programmed widenings that are scheduled for long range from South Sweetwater Road to SR 92/Fairburn Road and from SR 6/Thornton Road to South Sweetwater Road. In addition, Douglas County is submitting an application to ARC for a Livable Centers Initiative (LCI) grant for the Lithia Springs area around the South Sweetwater Road and US 78/Bankhead Highway intersection.

### **Travel Demand and Operational Characteristics**

The existing 2004 traffic volumes on Lee Road and South Sweetwater Road between I-20 and Bankhead Highway range from 13,150 vehicles per day (VPD) on Lee Road just north of the I-20 interchange to 9,250 VPD on South Sweetwater Road near Bankhead Highway. Using the level of service (LOS) guidelines from the *GRTA Developments of Regional Impact (DRI) Review-Technical Guidelines for Generalize Annual Daily Volumes*, the 2004 LOS on Lee Road and South Sweetwater Road between I-20 and Bankhead Highway ranges from C on Lee Road just north of the I-20 interchange to B on South Sweetwater Road near Bankhead Highway. In its current configuration, another operational issue is that the two-lane facility does not provide optimal passing opportunities, which causes vehicles to platoon.

The traffic volumes are projected to increase on Lee Road and South Sweetwater Road by 3.4% annually. The projected 2028 traffic volumes along Lee Road and South Sweetwater Road are expected to range from 28,180 VPD on Lee Road just north of the I-20 interchange, to 22,150 VPD on South Sweetwater Road near Bankhead Highway. Under no-build conditions, the future LOS in the year 2028 is projected to be E or below for Lee Road and South Sweetwater Road between I-20 and Bankhead Highway. The widening project would result in an improved LOS for the Lee Road and South Sweetwater Road sections in 2028 of C. (Note: The two lanes with center turn lane section of South Sweetwater Road between Skyview Drive and US 78/Bankhead Highway will fall to LOS D after 2022.) This project would improve capacity to an acceptable level and, in turn, would improve traffic operations by reducing vehicle delays and improving safety.

### **Safety**

Three years of crash data, years 2000 through 2002, were reviewed and analyzed along Lee Road and South Sweetwater corridor. The safety evaluation included calculating normalized crash rates and examining crash types for both roads. When compared to the statewide averages for a similarly classified facility as an urban minor arterial, the crash rates for both roads are below the statewide average for this functional classification for all years examined.

### **SOUTH SWEETWATER ROAD – URBAN MINOR ARTERIAL**

Year	2000	2001	2002
Total Accidents	22	10	15
Accidents per MVMT*	429	173	285
Statewide Accidents per MVMT (2001)	550	550	550

### **LEE ROAD – URBAN MINOR ARTERIAL**

Year	2000	2001	2002
Total Accidents	19	11	11
Accidents per MVMT*	529	295	505
Statewide Accidents per MVMT (2001)	550	550	550

\* MVMT – Rate per million vehicle miles travel.

In addition, the curvature of the roadway sections may be a contributor to the route's crash rates. Over the three-year period, there were a total of 17 collisions (38% of the total collisions for the roadway section) reported at the intersection of South Sweetwater Road and SR 5/Bankhead Highway involving the northbound approach. There is no predominant type of crash at this intersection during this time period. Rear-end collisions accounted for 25%, and angle-intersect and side-swipe each accounted for 37.5%. The proposed roadway widening and the addition of a turn lane at the intersection may improve safety.

### **Community Issues**

Douglas County is a member county of the ARC planning area. As a suburban Atlanta county, Douglas County has experienced significant population growth in the past two decades. Between 1980 and 2000, Douglas County population grew by over 37,600 persons (69%) to a 2000 population of 92,174. The U.S. Census population estimate for 2003 was 102,015, an increase of nearly 11% since the 2000 decennial census. In the Douglas County draft 2025 Comprehensive Plan, the 2025 population projection for the County is 240,758, a doubling of the existing population. The Lee Road and South Sweetwater Road widening is one piece of regional and county-wide transportation plans to accommodate the existing and future travel demand growth spurred by the demographic changes in the County and region.

2000 Census data by block group was reviewed to identify environmental justice communities in the project area. In 2000, the county-wide non-white population comprised 24.1% of the population. The poverty status for individuals county-wide was 7.8% of the population. There may be a larger proportion of both non-white persons and persons below the poverty line in the southeast portion of the project area. Block group 3, Census tract 801.01 (bounded by Skyview Drive on the north, Sweetwater Road/Lee Road on the west, I-20 on the south, and the Cobb County line on the east) had a larger proportion of non-white population (45.3%) and a population of persons below the poverty line (13%) than county-wide, 24.1% and 7.8%, respectively. Since this block group extends a distance beyond the project area, these populations may not be directly impacted by the project; however, attention should be given to including these populations in the project development process.

Land uses along the project corridor vary. Existing zoning includes pockets of low density residential, commercial, light industrial, and neighborhood commercial. Planned future land use shows the corridor predominately classified as Community Village Center on the southern portion of the corridor from I-20 to East Linda Drive, and mixed use on the northern portion of the corridor from East Linda Drive and US 78. There is a small area of urban residential land use just south and west of the Inman Street and South Sweetwater Road intersection. A Douglas County fire station is currently under construction west of South Sweetwater and south of Groovers Lake Road. Much of the area west of Lee Road and south of Vulcan Lane is in the City of Douglasville. The Community Village Center and mixed use land use designations are compatible with the Lee Road/South Sweetwater Road widening project. Both

designations include higher intensity, mixed-use development. Improving the street and pedestrian connections between this corridor and intersecting streets is important in these land uses. Two Douglas County schools are within one-half mile of Sweetwater Road North off of Junior High Drive, Lithia Springs Elementary, with a 2004-2005 student population of approximately 550 students, and Turner Middle School with a 2004-2005 student population of approximately 800 students.

### **Logical Termini**

The Lee Road/South Sweetwater Road widening project improves safety, operations, and mobility between US 78/SR 5/SR 8/Bankhead Highway and I-20 West. The US 78/SR5/SR 8/Bankhead Highway corridor is a major Douglas County mixed use corridor which is also planned for widening. Lee Road south of I-20 and the Lee Road Bridge at I-20 are also planned for widening, so this project is an important piece in a system-wide improvement.

### **Need and Purpose**

The need exists to improve safety, operations, and mobility for local and through traffic in Douglas County to accommodate its growing population. Widening Lee Road and South Sweetwater Road from US 78/SR 5/SR 8/Bankhead Highway to Vulcan Drive will facilitate a better connection from I-20 and the Bankhead Highway corridor by improving the north-south movement in realigning the intersection of Lee Road to South Sweetwater Road. The improvement will have a beneficial impact on traffic safety by directing turning movements at signalized intersections, providing turning lanes at major intersections and providing sidewalks and cross-walks at intersections.

### **COUNTY ROAD (CR) 817 / LEE ROAD WIDENING – PHASE 2, MSL-0004-00(428), P. I. NO. 0004428**

The proposed project is planned as a four-lane divided facility that would extend from SR 92 to approximately 1,100 feet south of I-20. The northern terminus of this project would tie into the proposed project for a 7-8 lane bridge over I-20 and the proposed four-lane section of Lee Road (Lee Road, Phase 1 project) going from I-20 to US 78/SR 5/SR 8. Future traffic projections suggest that the Lee Road widening has independent utility because projected traffic on Lee Road between SR 92 and I-20 indicates a capacity constrained condition.

Lee Road functions as an arterial route connecting traffic on SR 92 to I-20. The need exists to provide local and through traffic with improved transportation infrastructure on Lee Road that dramatically increases the roadway's existing capacity. The existing year 2004 daily traffic volume on Lee Road is 13,345 VPD between SR 92/Fairburn Road and I-20. The purpose of the proposed project is to provide the additional capacity needed to accommodate the projected number of trips that are likely to use this roadway facility for either local access or as a travel corridor between SR 92 and I-20. The projected number of daily trips is 15,020 for the year 2008 and 27,128 for the year 2028. Using the level of service (LOS) guidelines from the *GRTA Developments of Regional Impact Review-Technical Guidelines for Generalized Annual Daily Volumes*, the LOS at each of the three major intersections along Lee Road was determined for year 2004, 2008 and the design year 2028 and is shown below. The analysis of the intersections of Lee Road at East County Line Road and Lee Road at Fairburn Road indicate that these intersections will operate at an unacceptable LOS in the future year 2028 without improvements to Lee Road.

## LEVEL OF SERVICE

Intersection	2004	2008	2028 w/o Improvements	2028 w Improvements
Lee Road at East County Line Road	C	C	F	C
Lee Road at South County Line Road	B	B	F	D
Lee Road at Fairburn Road	C	C	F	D

Widening Lee Road would provide a safer environment for vehicles to operate as well as facilitate the movement of freight more efficiently from its nearby generators to I-20 and points beyond. Three years of crash data, years 2001 through 2003, were reviewed and analyzed for the section of Lee Road between SR 92/Fairburn Road and I-20. Noted below indicates the total number of accidents and the accident rate along this stretch of Lee Road and compares this with the statewide accident rate averages for facilities functionally classified as Urban Minor Arterials. The accident rate for Lee Road is considerable higher than the statewide average for this functional classification for all years examined.

### LEE ROAD (CR 817)

Year	2000	2002	2003
Total Accidents	89	81	96
Accidents per MVMT*	823	749	944
Statewide Accident Rate MVMT	564	577	585

\* MVMT – Rate per million vehicle miles travel.

There are two projects in the area that must be coordinated with this Lee Road widening project. They are: (1) Lee Road/South Sweetwater Road – Phase 1 (from I-20 west to US 78), listed as TIP number DO-022 and Lee Road Bridge over I-20, listed as TIP number DO-220B. The Lee Road, Phase 2 project (DO-220A) and the other two area projects (DO-022 and DO-220B) are all scheduled for construction in fiscal year 2007.

A portion of Lee Road from East County Line Road to South Sweetwater lies within Douglas County's Bicycle and Pedestrian Path Plan. This plan proposes a multi-use path along the east side of Lee Road from East County Line Road to South Sweetwater that would connect Lithia Springs High School with the Sweetwater Creek Park Recreational Area.

CR 817/Lee Road is a primary north-south corridor in Douglas County, Georgia. The proposed project will improve CR 817/Lee Road from SR 92/Fairburn Road to approximately 1,100 feet south of the existing eastbound entrance and exit ramps at I-20. Improvements consist of widening Lee Road from a two-lane roadway with a rural section to a four-lane urban roadway divided by a 20-foot wide raised grass median. The existing five-foot grassed shoulders will be replaced with 16-foot shoulders with curb and gutter and five-foot sidewalks. An eight-foot asphalt multi-use trail will be placed within the 16-foot shoulder along the east side of Lee Road from East County Line Road to the end of the project to accommodate Douglas County's Bicycle Pedestrian Plan. The existing traffic signal at SR 92/Fairburn Road will be upgraded to provide protected left turning movements. The intersection with SR 92/Fairburn Road will be constructed to provide for two left-turn lanes and a right-turn lane with storage along Lee Road. The signal at East County Line Road will be replaced with a new signal with signal phasing for protected left turns. The intersection at East County Line Road will be reconstructed to provide left- and right-turn lanes with storage. The intersection of Lee Road and South County Line Road will be reconstructed to provide left- and right-turn lanes with storage. Left turning movements from South County Line Road will be stop sign controlled and right turns will be yield sign controlled.

Additional turn lanes will be provided along Lee Road as required. The total length of the proposed project is approximately 2.73 miles.

**U.S. INTERSTATE HIGHWAY 20 (I-20) / LEE ROAD INTERCHANGE RECONSTRUCTION AND WIDENING OF LEE ROAD, NHS-0001-00(917), P. I. NO. 0001917**

**Need and Purpose**

The need exists to improve safety, operations and mobility for traffic in Douglas County to accommodate its growing population. The purpose of this proposed project is to provide the additional capacity on Lee Road needed to accommodate the projected number of trips that are likely to use this roadway facility for travel to and from I-20. Additionally, the Lee Road Bridge over I-20 will require replacement to accommodate the widening of I-20 to provide barrier separated HOV lanes.

A portion of Lee Road from East County Line Road to South Sweetwater Road lies within Douglas County’s Bicycle and Pedestrian Path Plan. This plan proposes a multi-use path along the east side of Lee Road from East County Line Road to South Sweetwater Road that would connect Lithia Springs High School with the Sweetwater Creek Park Recreational Area.

The proposed project would widen Lee Road from a two-lane to a four-lane divided highway with a 20-foot raised median from the northern terminus of Project MSL-0004-00 (428) to the southern terminus of Project MSL-0004-00 (427) at Vulcan Drive. It will also include an eight-foot multi-use path on the east side of Lee Road and a five-foot sidewalk on the west side.

**Annual Daily Traffic Volumes and Levels of Service**

The I-20/Lee Road Interchange in Douglas County serves as an arterial route for commuters to access I-20 from the suburban areas of Douglas County. The existing ramps and the two-lane bridge overpass do not provide sufficient left-turn and through capacity for the high peak hour turning movements experienced at this interchange. Currently, peak hour traffic conditions at the ramp intersections can cause excessive queuing to occur extending back onto the freeway.

Existing and future intersection capacity analysis was performed under existing and future traffic conditions with and without the proposed project. The vehicular delay value that results from the capacity analysis is used to determine the LOS of an intersection. The LOS is a letter designation used to describe traffic operating conditions, on a declining scale from A to F. LOS “A” represents free-flow traffic conditions and LOS “F” represents extreme delays with stopped traffic conditions. A summary of the intersection capacity analyses in terms of level of service and delay (seconds per vehicle) for existing, no-build and build conditions are shown below.

**Summary of Intersection Capacity Analysis Results**

	AM (Delay)	PM (Delay)	AM (Delay)	PM (Delay)	AM (Delay)	PM (Delay)
Lee Road at Villas at West Ridge	E* (45.6)	D* (31.8)	F (287.4)	F (300.5)	A (5.0)	A (6.8)
Lee Road at Monier Boulevard	F* (462.1)	F* (264.9)	F (652.5)	F (1119)	C*_(23.0)	C* (20.5)
Lee Road at I-20 Eastbound Ramps	C (28.1)	C (21.1)	F (1585)	F (625.5)	C (32.7)	C(20.2)

Lee Road at I-20 Westbound Ramps	B (12.1)	C (34.4)	F (822.8)	F (2238)	B (16.1)	C (22.3)
Lee Road at Sweetwater Industrial Boulevard	F* (264.9)	F* (154.8)	F (538.4)	F (880.7)	--	--
Lee Rd at Vulcan Drive	D* (25.0)		F (1130)	F (3917)	C(26.5)	C(30.0)

\* For unsignalized intersections, LOS is given for minor street approach.

Existing and future intersection capacity analysis indicates that the intersections within the project area would operate at level of service “F” without any improvements to Lee Road and its interchange at I-20.

The Average Daily Traffic (ADT) of Lee Road is 24,100 VPD for the base year 2010 and 34,100 VPD for the design year 2030. These volumes exceed the capacity of a two-lane roadway, bridge, and related intersections.

### Safety Improvements

In addition to the extreme traffic congestion, Lee Road has a high rate of traffic accidents. An inventory of crash data from 2002 to 2004 is provided in the table below.

#### Crash Data Comparison to Statewide Rates for Minor Arterials

Roadway Segment	Year	No. of Accidents	Accident Rate	Statewide Accident Rate	No. of Injuries	In jury Rate	Statewide Injury Rate
Lee Road (0.51 mi.)	2002	63	1958	577	24	746	222
	2003	69	2127	585	41	1264	223
	2004	65	1991	509	31	950	194

The results indicate that Lee Road currently has accident and injury rates that exceed three times the statewide average for minor arterials. There were 16 angle collisions and 36 rear-end collisions along this section of Lee Road in 2004. Of the 16 angle collisions, there were 5 that occurred at the unsignalized intersection of Lee Road at Sweetwater Industrial Boulevard. This project proposes to connect Sweetwater Industrial Boulevard to Lee Road at Vulcan Drive, an intersection controlled by a traffic signal. This improvement would allow motorists to safely access Lee Road from the Sweetwater Industrial Park at a signalized intersection. Consequently, this project would reduce the risk of various common accidents, specifically rear-end and angle collisions at intersections.

In summary, the proposed reconstruction and improvement of the Lee Road/I-20 Interchange would correct the existing roadway deficiencies, improve traffic safety and increase the capacity of the roadway to facilitate the projected traffic growth.

There are two projects in the area that must be coordinated with the I-20/Lee Road Interchange Improvement project: (1) Lee Road/South Sweetwater Road Widening - Phase 1 (from Vulcan Drive to US 78) listed as TIP number DO-022 and CR 817/Lee Road Widening - Phase 2 (from SR 92 to approximately 1,300 feet south of I-20, listed as TIP number DO-022A. These projects and the I-20/Lee Road Interchange project are all scheduled for construction in fiscal year 2008.

### CONSTRUCTION COSTS

The following costs are attributed to each of the above described projects:

- Lee Road/Sweetwater Road Widening – Phase 1, MSL-0004-00(427), P. I. No. 0004427 - The probable cost of construction for this project is based on Carter & Burgess, Inc. undated cost estimate and is listed as \$15,294,393. This figure is comprised of: (1) Construction Subtotal at \$8,110,800, (2) Engineering and Construction (10.00%) at \$811,080, (3), Inflation (10.25% based on 5.00% per annum for two years) at \$914,493, (4) Construction Total at \$9,836,393, (5) Right-of-way costs at \$4,858,000, and (6) Reimbursable Utilities at \$600,000.
- CR 817/Lee Road Widening – Phase 2, MSL-0004-00(428), P. I. No. 0004428 - The probable cost of construction for this project is based on The LPA Group, Inc. cost estimate dated December 20, 2006 and is listed as \$18,086,336. This figure is comprised of: (1) Construction Subtotal at \$12,027,488, (2) Engineering and Construction (10.00%) at \$1,202,749, (3), Inflation (10.25% based on 5.00% per annum for two years) at \$1,356,099, (4) Construction Total at \$14,586,336, and (5) Right-of-way costs at \$3,500,000.
- I-20/Lee Road Interchange Reconstruction and Widening of Lee Road, NHS-0001-00(917), P. I. No. 0001917 - The probable cost of construction for this project is based on Moreland Altobelli Associates, Inc. cost estimate dated August 8, 2006 and is listed as \$47,266,995. This figure is comprised of: (1) Construction Subtotal at \$14,257,008, (2) Engineering and Construction (10.00%) at \$1,425,701, (3), Inflation (15.76% based on 5.00% per annum for three years) at \$2,471,987, (4) Construction Total at \$18,154,987, (5) Right-of-way costs at \$28,762,299, and (6) Reimbursable Utilities at \$350,000.

---

---

## **VALUE ANALYSIS AND CONCLUSIONS**

---

---

### **GENERAL**

This section describes the procedures used during the value engineering study. It is followed by separate narratives and conclusions concerning:

- Value Engineering Study Agenda
- Value Engineering Workshop Participants
- Economic Data
- Cost Estimate Summary and Cost Histograms
- Function Analysis
- Creative Idea Listing and Judgment of Ideas

A systematic approach was used in the VE study, and the key procedures involved were organized into three distinct parts: 1) preparation; 2) VE workshop; and 3) post-study. A Task Flow Diagram that outlines each of the procedures included in the VE study is attached for reference.

### **PREPARATION EFFORT**

Pre-study preparation for the VE effort consisted of scheduling study participants and tasks; gathering necessary background information on the project; and compiling project data into a cost model and graphic cost histogram. Information relating to the design, construction, and operation of the project is important as it forms the basis of comparison for the study effort. Information relating to funding, project planning operating needs, systems evaluations, basis of cost, soil conditions, and construction of the roadways was also a part of the analysis.

### **VALUE ENGINEERING WORKSHOP EFFORT**

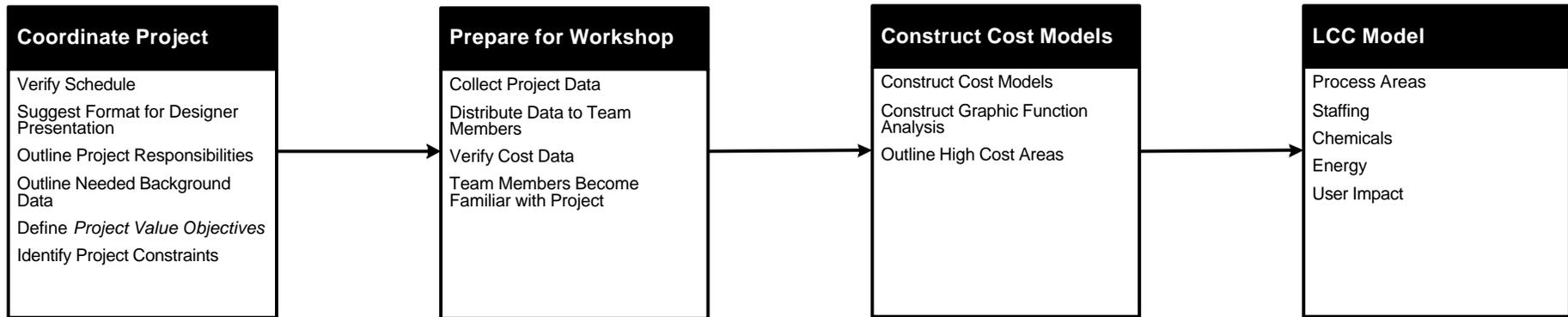
The VE workshop was a three and a half-day effort (see attached agenda). During the workshop, the VE job plan was followed. The job plan guided the search for high cost areas in the project and included procedures for developing alternative solutions for consideration. It includes six phases:

- Information Phase
- Function Identification and Analysis Phase
- Creative Phase
- Evaluation Phase
- Development Phase
- Presentation Phase

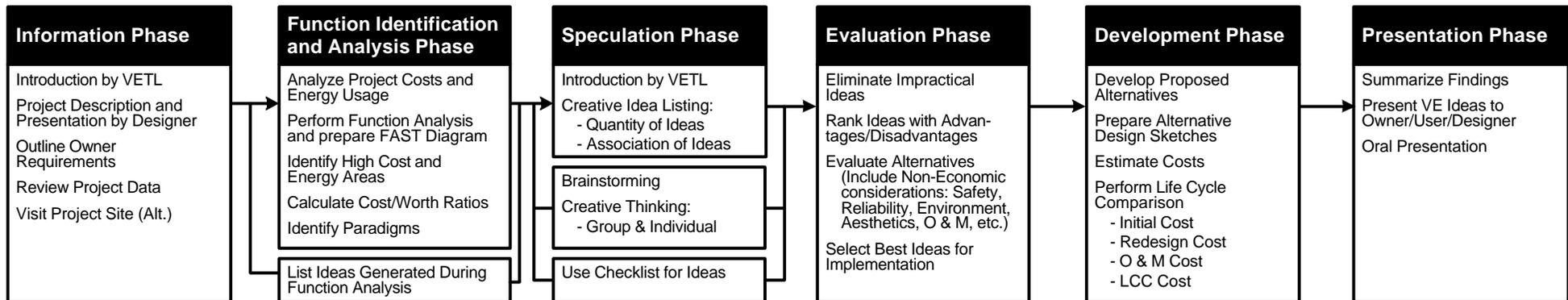


# Value Engineering Study Task Flow Diagram

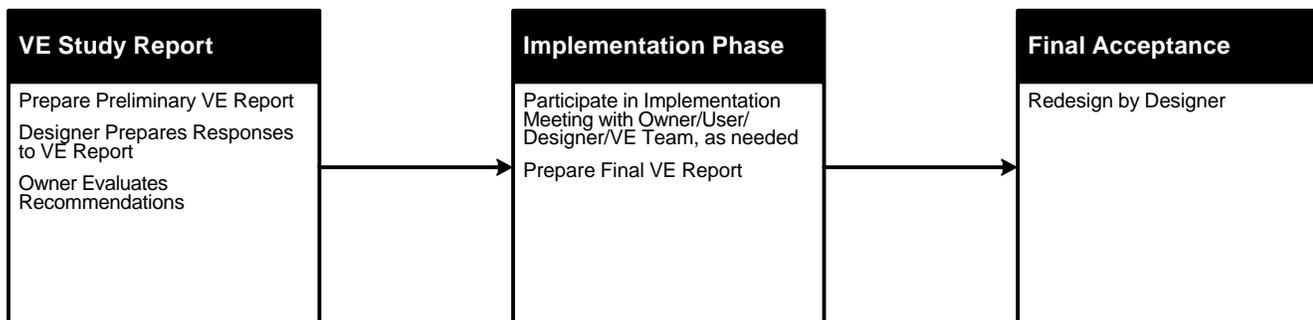
## Preparation Effort



## Workshop Effort



## Post-Workshop Effort



## Information Phase

At the beginning of the study, the conditions and decisions that have influenced the development of the project must be reviewed and understood. For this reason, the development manager presented information about the project to the VE team on first day of the session. Following the presentation, the VE team discussed the project using the following documents:

- **Project Concept Report** prepared by the Department of Transportation, State of Georgia, Office of Preconstruction for P. I. No. 0004427, Douglas County, Project Number MSL-0004-00(427), Lee Road/Sweetwater Road Widening – Phase 1; dated April 26, 2005; Containing: (1) Project Need and Purpose, (2) Project Location and Description/Traffic, (3) Existing Roadway, (4) Proposed Roadway, (5) Project Costs, (6) Meeting Minutes, (7) Technical Memorandum, (8) Phase 1 Environmental Site Assessment, and (9) Updated Project Costs;
- **Half Size Drawings of Plan and Profile** entitled Plan and Profile of Proposed Widening Lee Road – South Sweetwater Road, Douglas County; Federal Aid Project MSL-0004-00(427); Georgia DOT P. I. No. 0004427; State Route No. N/A; prepared for the Department of Transportation, State of Georgia by Carter & Burgess, Inc., dated December 21, 2006 (run date);
- **Project Concept Report** prepared by the Department of Transportation, State of Georgia, Office of Preconstruction for P. I. No. 0004428, Douglas County, Project Number MSL-0004-00(428), CR 817/Lee Road Widening – Phase 2; dated July 20, 2005; Containing: (1) Project Location Map, (2) Project Need and Purpose and Descriptions, (3) Project Costs, (4) Typical Sections, (5) Meeting Minutes, (6) Traffic Volumes, and (7) Updated Project Costs;
- **Half Size Drawings of Plan and Profile** entitled Plan and Profile of Proposed Widening Lee Road/CR 817 Improvements, Douglas County; Federal Aid Project MSL-0004-00(428); Georgia DOT P. I. No. 0004428; U.S. Route: N/A; State Route No. N/A; County Route: 817; prepared for the Department of Transportation, State of Georgia by The LPA Group, dated December 19, 2006 (run date);
- **Project Concept Report** prepared by the Department of Transportation, State of Georgia, Office of Preconstruction for P. I. No. 0001917, Douglas County, Project Number NHS-0001-00(917), I-20/Lee Road Interchange; dated October 4, 2006; Containing: (1) Project Location Map, (2) Project Need and Purpose and Descriptions, (3) Project Costs, (4) Typical Sections, (5) Traffic Volumes, (6) Traffic Volumes and Analyses, (7) Meeting Minutes; all enclosures by Moreland Altobelli and Associates;
- **General Highway Map**, Douglas County, Georgia, prepared by the Department of Transportation, Division of Planning and Programming, Planning Data Services in cooperation with the U.S. Department of Transportation, Federal Highway Administration, dated 1985;
- **Traffic Count Map**, Fulton County, Georgia, prepared by the Department of Transportation, Division of Planning and Programming, Planning Data Services in cooperation with the U.S. Department of Transportation, Federal Highway Administration, Revised 1983;
- **Atlanta Aero Atlas**, Metropolitan Series, prepared by Aero Surveys of Georgia, Inc., dated October 1994 to October 1995;
- **Compact Disc**, Containing P. I. 0004427, Lee Road Phase 1 project .dgn files;
- **Compact Disc**, Containing P. I. 0004428, Lee Road Phase 2 project .dgn files;
- **Public Information Open House, Widening Lee Road-South Sweetwater Road, Phase 1 Aerial Map**, depicting MSL-0004-00(427), Douglas County, P. I. 0004427, prepared by Carter & Burgess, Inc., dated January 13, 2005;
- **Public Information Open House, Widening and Reconstruction of CR 817 / Lee Road from SR 92, Fairburn Road to I-20 (Phase 2) Aerial Map**, depicting MSL-0004-00(428), Douglas County, P. I. 0004428, prepared by LPA Group, dated December 19, 2006 (run date); and
- **Concept Plan, Lee Road/I-20 Interchange Aerial Map**, depicting NHS-0001-00(917), P. I 0001917, Douglas County, prepared by Moreland Altobelli & Associates, Inc., dated April, 2006;

## **Function Identification and Analysis Phase**

Based on historical and background data, a cost model and graphic function analysis were developed for this project by major construction elements. They were used to distribute costs by project element; serve as a basis for alternative functional categorization; and assign worth to the categories, where worth is the least cost to provide the required function, as determined by the VE team. The VE team identified the functions of the various project elements and subsystems by using random function generation techniques resulting in the attached Random Function Analysis worksheet and Function Analysis Systems Technique (F.A.S.T.) diagram.

## **Creative Phase**

This VE study phase involved the creation and listing of ideas. Creative idea worksheets were organized by project element. During this phase, the VE team developed as many ideas as possible to provide the necessary functions within the project at a lower cost to the owner, or to improve the quality of the project. Judgment of the ideas was restricted at this point. The VE team was looking for a large quantity of ideas and association of ideas.

GDOT, county and design team representatives may wish to review the creative list since it may contain ideas that can be further evaluated for potential use in the design.

## **Evaluation Phase**

During this phase of the workshop, the VE team judged the ideas generated during the creative phase. Advantages and disadvantages of each idea were discussed to find the best ideas for development. Ideas found to be irrelevant or not worthy of additional study were discarded. Those that represented the greatest potential for cost savings or improvement to the project were then developed further.

The VE team would like to develop all ideas, but time constraints usually limit the number that can be developed. Therefore, each idea was compared with the present schematic design concepts, in terms of how well it met the design intent. Advantages and disadvantages were discussed, and each team member rated the ideas on a scale of 0-5, with the best ideas rated 5. Total scores were summed for each idea, and only highly-rated ideas were developed into alternatives. In cases where there was little cost impact but an improvement to the project was anticipated, the designation DS, for design suggestion, was used. The design team should review this listing for possible incorporation of ideas into the project.

The creative listing was re-evaluated frequently during the process of developing alternatives. As the relationship between creative ideas became more clearly defined, their importance and ratings may have changed, or they may have been combined into a single alternative. For these reasons, some of the originally high-rated items may not have been developed into alternatives.

## **Development Phase**

During the development phase, each highly-rated idea was expanded into a workable solution. The development consisted of a description of the alternative, life cycle cost comparisons, where applicable, and a descriptive evaluation of the advantages and disadvantages of the proposed alternatives. Each alternative was written with a brief narrative to compare the original design to the proposed change. Sketches and design

calculations, where appropriate, were also prepared in this part of the study. The VE alternatives are included in the section entitled Study Results.

### **Presentation Phase**

The last phase of the VE study was the presentation of the findings. The VE alternatives were screened by the VE team before draft copies of the Summary of Potential Cost Savings worksheets were provided to GDOT representatives during an informal oral presentation on the last day of the study. The VE alternatives were arranged in the same order as the idea listing sheets to facilitate cross-referencing.

### **POST-WORKSHOP EFFORT**

The post-study portion of the VE study includes the preparation of this Value Engineering Study Report. Personnel from GDOT, county and design teams will analyze each alternative and prepare a short response, recommending either incorporating the alternative into the project, offering modifications before implementation, or presenting reasons for rejection. Lewis & Zimmerman Associates, Inc. is available at your convenience as you review the alternatives. Please do not hesitate to call on us for clarification or further information as you consider an implementation approach.

---

---

## VALUE ENGINEERING STUDY AGENDA

---

---

Lewis & Zimmerman Associates, Inc. (LZA) will conduct a 28-hour Value Engineering (VE) study simultaneously on the following projects: **MSL-0004-00(427), P. I. No. 0004427, Lee Road / Sweetwater Road Widening – Phase 1; MSL-0004-00(428), P. I. No. 0004428, CR 817 / Lee Road Widening – Phase 2; and NHS-0001-00(917), P. I. No. 0001917, I-20 / Lee Road Interchange Reconstruction.** The projects are located in Douglas County, Georgia. It is expected the owner, the Georgia Department of Transportation (GDOT), and the respective design firms: Carter & Burgess, Inc. (C&B), the LPA Group (LPA), and Moreland Altobelli Associates, Inc. (MA), will be available to make a formal presentation concerning the project at the beginning of the workshop and be available to answer questions during the VE study effort.

### VE Study Agenda

The VE study will follow the outline described below and be conducted January 9 – 12, 2007. The study will be conducted in Personnel's Conference Room, Room 274B of GDOT's General Office located at No. 2 Capitol Square Street, Atlanta, Georgia 30334. The point-of-contact is Ms. Lisa L. Myers, Design Review Engineer Manager, who can be reached at 404-651-7468.

#### Tuesday, January 9<sup>th</sup>

9:00 am – 9:15 am                      **General Introduction of all Parties and review of the VE Process**

9:15 am - 11:15 am                    **Owner's / Designer's Presentation**

GDOT and the design firms are to present information concerning the projects including, but not necessarily limited to: rationale for design, criteria for specific areas of study, project constraints, and the reasons for design decisions.

11:15 am - 12:00 noon                **Commence Function Analysis Phase**

The VE team will continue their familiarization with the cost models and project data for each area of study. The cost model(s) will be refined, as necessary; define the function of each project element or system in the cost model, select the primary or basic functions, and determine the worth, or least cost, to provide the function. Cost / worth or value index ratios will be calculated, and high cost / low worth areas for study identified. In addition, the VE team will continue defining the function of each element / system to gain a thorough understanding of the project's needs and requirements.

12:00 noon - 1:00 pm                **Lunch**

1:00 pm - 5:00 pm                    **Conclude the Function Analysis Phase and Commence the Creative Phase**

The VE team will conduct a brainstorming session and list as many ideas as possible for consideration. The aim is to obtain a large quantity of ideas through free association, by eliminating roadblocks to creativity and deferring judgment.

### **Wednesday, January 10<sup>th</sup>**

8:30 am - 10:00 am                      **Conclude Creative Phase and Complete Evaluation / Analytical Phase**

The VE team will analyze the ideas listed in the creative phase and select the best ideas for further development.

10:00 am - 12:00 noon                  **Development Phase**

VE team will develop creative ideas into alternate design solutions. Initial and life cycle cost estimates comparing original and proposed alternatives will be prepared. Selected alternatives for change will be developed and supported with sketches, calculations and written substantiation.

12:00 noon - 1:00 pm                  **Lunch**

1:00 pm - 5:00 pm                      **Continue Development Phase**

### **Thursday, January 11<sup>th</sup>**

8:30 am - 12:00 am                      **Continue Development Phase**

12:00 noon - 1:00 pm                  **Lunch**

1:00 pm - 4:00 pm                      **Conclude Development Phase**

4:00 pm – 5:00 pm                      **Commence Summary Worksheets for Information oral Presentation**

Upon completion of the Development Phase, the VE facilitator will commence preparation of the summary worksheets based on the alternatives developed by the VE team. The summary worksheets will form the basis of the informal oral presentation.

### **Friday, January 12<sup>th</sup>**

8:00 am - 10:30 am                      **Finalize Summary Worksheets and Prepare for Oral Presentation Strategies**

9:00 am – 10:30 am                      **Informal Oral Presentation**

The VE team presents its alternatives to the owner and design teams' representatives and is available to clarify any points. The process for accepting / rejecting VE alternatives is described and a target schedule for meeting to finalize implementation decisions is established.

10:20 am                                      **Adjourn**

## **VALUE ENGINEERING WORKSHOP PARTICIPANTS**

---

The VE team was organized to provide specific expertise on the unique project elements involved. Team members consisted of a multidisciplinary group with professional design experience and a working knowledge of VE procedures. The VE team included the following professionals:

John P. Tiernan, PE	Bridge/Structural Engineer	ARCADIS-US, Inc.
Dominic F. Saulino	Transportation Engineer	HNTB
Jeffery G. Dingle, PE	Construction Specialist/ Transportation Engineer	Delon Hampton and Associates
Luis M. Venegas, PE, CVS	VE Facilitator	LZA

### **OWNER/DESIGNER PRESENTATION**

Representatives from GDOT, the county and the design team presented an overview of the projects on Tuesday, January 9, 2007. The purpose of this meeting, in addition to being an integral part of the Information Gathering Phase of the VE Study, was to bring the VE team “up-to-speed” regarding the overall project. Additionally, the meeting afforded the design team the opportunity to highlight in greater detail those areas of the project requiring additional or special attention.

### **VALUE ENGINEERING TEAM FINAL PRESENTATION**

The VE team conducted an informal oral presentation on Friday, January 12, 2007 to GDOT, county and design team representatives where copies of the draft Summary of Potential Cost Savings worksheets were provided for interim use by GDOT personnel.

A copy of the meeting participants is attached for reference.

# VALUE ENGINEERING ATTENDEES

## MEETING PARTICIPANTS



<b>PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1,                      MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,                      NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION                      Douglas County, Georgia Department of Transportation, District 7                      Preliminary Design Stage</b>		Date: <b>January                      9 – 12, 2007</b>
NAME & E-MAIL (PLEASE PRINT)	ORGANIZATION/TITLE	PHONE/FAX
Name: James (Lonnie) Jones GDOT Employee No.: 00195448  em: lonnie.jones@dot.state.ga.us	Organization: GDOT, Office of Construction  Title: Construction Liaison Engineer	ph: 404-326-6235 cell:  fx: 404-656-3507
Name: Joseph (Joe) King GDOT Employee No.: 00343482  em: joe.king@dot.state.ga.us	Organization: GDOT, Office of Bridge Design  Title: Assistant Group Leader	ph: 404-656-5195 cell:  fx:
Name: Michael Lankford GDOT Employee No.:  em: michael.lankford@dot.state.ga.us	Organization: GDOT  Title: Area Engineer	ph: 404-326-5249 cell:  fx:
Name: Scott Lee GDOT Employee No.: 00296593  em: scott.lee@dot.state.ga.us	Organization: GDOT  Title: District Design Engineer	ph: 404-463-4947 cell:  fx: 770-986-1022
Name: Mike Lobdell GDOT Employee No.: 00350181  em: mike.lobdell@dot.state.ga.us	Organization: GDOT  Title: District Preconstruction Engineer	ph: 404-463-4947 cell: 404-290-0137  fx: 770-986-1022
Name: Ralph Merrow, Jr. GDOT Employee No.: 00317735  em: ralph.merrow@dot.state.ga.us	Organization: GDOT  Title: District Design Squad Leader	ph: 404-463-4947 cell:  fx: 770-986-1022
Name: Gerald (Jerry) A. Milligan GDOT Employee No.:  em: jerry.milligan@dot.state.ga.us	Organization: GDOT, Office of Right of Way  Title: Supervisor Appraisal Estimator	ph: 770-986-1541 cell:  fx: 770-986-1558
Name: Zanda Montgomery GDOT Employee No.: 000864370  em: zanda.montgomery@dot.state.ga.us	Organization: GDOT  Title: Environmental	ph: 404-463-4947 cell:  fx:
Name: Lisa L. Myers GDOT Employee No.: 00244168  em: lisa.myers@dot.state.ga.us	Organization: GDOT, General Office (GO)  Title: Design Review Engineer Manager, Value Engineering Coordinator	ph: 404-651-7468 cell:  fx: 404-463-6131
Name: Brian Summers, PE GDOT Employee No.:  em: brian.summers@dot.state.ga.us	Organization: GDOT, GO  Title: Project Review Engineer	ph: 404-656-6843 cell:  fx: 404-464-6131

# VALUE ENGINEERING ATTENDEES

## MEETING PARTICIPANTS



NAME & E-MAIL (PLEASE PRINT)		ORGANIZATION/TITLE	PHONE/FAX
<b>PROJECT: MSL-0004-00(427) LEE / SWEETWATER ROADS WIDENING PHASE 1, MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2, NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION Douglas County, Georgia Department of Transportation, District 7 Preliminary Design Stage</b>			Date: <b>January 9 – 12, 2007</b>
Name: Ken Werho GDOT Employee No.: 00258268  em: ken.werho@dot.state.ga.us		Organization: GDOT, Office of Traffic and Design  Title: Traffic Operations Design Review and Concept Manager	ph: 404-635-8144 cell:  fx: 404-635-8116
Name: Ron Wishon GDOT Employee No.:  em: ron.wishon@dot.state.ga.us		Organization: GDOT, GO  Title: Design Review Engineer Manager	ph: 404-651-7470 cell:  fx: 404-635-8116
Name: Randy Hulsey GDOT Employee No.:  em: rhulsey@co.douglas.ga.us		Organization: Douglas County Department of Transportation  Title: Director	ph: 770-920-7508 cell:  fx: 770-920-7516
Name: Ronald Nix GDOT Employee No.:  em: r_jnix@yahoo.com		Organization: Moreland Altobelli Associates, Inc.  Title: Project Manager	ph: 770-607-0085 cell:  fx:
Name: Danny Godwin GDOT Employee No.:  em: dgodwin@lpagroup.com		Organization: The LPA Group, Inc. (LPA)  Title: Project Manager, Senior Transportation Consultant	ph: 770-263-9118 cell: 770-851-3516  fx: 770-263-9145`
Name: John Weingard GDOT Employee No.:  em: jweingard@lpagroup.com		Organization: LPA  Title: Project Manager	ph: 770-263-9118 cell:  fx: 770-263-9145`
Name: Jeffery (Jeff) G. Dingle, PE GDOT Employee No.:  em: jdingle@delonhampton.com		Organization: Delon Hampton & Associates, Chartered  Title: Vice President, Southern Regional Office	ph: 404-524-8030 cell: 404-427-0155  fx: 404-524-2575
Name: Dominic (Dom) F. Saulino GDOT Employee No.:  em: dsaulino@hntb.com		Organization: HNTB  Title: Director of Transportation	ph: 404-975-7542 cell: 678-206-9205  fx: 404-841-2820
Name: John P. Tiernen, PE GDOT Employee No.:  em: jteirnen@arcadis-us.com		Organization: ARCADIS US  Title: Senior Bridge Engineering	ph: 770-431-8666 cell:  fx: 770-435-2666
Name: Luis M. Venegas, PE, CVS-Life, LEED® AP GDOT Employee No.:  em: lvenegas@lza.com		Organization: Lewis & Zimmerman Associates, Inc.  Title: VE Facilitator	ph: 770-992-3032 cell: 678-488-4287  fx: 770-435-2666

## ECONOMIC DATA

---

The VE team developed economic criteria for evaluation with information gathered from the State of Georgia Department of Transportation, Carter & Burgess, Inc., The LAP Group, Inc., and Moreland Altobelli Associates, Inc. To express costs in a meaningful manner, the VE team alternatives are presented on the basis of discounted present worth. Criteria for planning project period interest rates are based on the following parameters:

Year of Analysis:	<b>2007</b>
Construction Start Up:	<b>±2010</b>
Construction Duration:	<b>±36 Months (2013)</b>
Economic Planning Life:	<b>35 years for Pavement</b>
Economic Planning Life:	<b>50 years for Bridges</b>
Discount Rate/Interest:	<b>2.50%</b> (Extrapolated from latest United States Office of Management and Budget Circular A-94, Appendix C – January 2006)
Inflation / Escalation Rate:	<b>5.00%</b> (Per GDOT)
Uniform Present Worth (UPW) Factor:	<b>23.1452</b> for 35 years <b>28.3623</b> for 50 years
Cost of Power: (assumed)	<b>\$0.07 / kWhr</b> (kilowatt hour)
Operation and Maintenance Costs ( <i>Industry Norms</i> ):	
Equipment - With Many Moving Parts	<b>5.00%-5.50%+ of Capital Cost</b>
Equipment - With Minimal Moving Parts	<b>3.50%-4.00% of Capital Cost</b>
Equipment - Electronic	<b>3.00% of Capital Cost</b>
Structural	<b>1.00%-2.00% (or less) of Capital Cost</b>
Composite Mark-Up (Construction) for Phase 1 and: Phase 2 ( <i>Composed of: Engineering and Construction at 10.00% and Inflation at 10.25%.</i> )	<b>21.28%</b> (1.2128)
Composite Mark-Up (Construction) for the I-20 / Lee: Road Interchange ( <i>Composed of: Engineering and Construction at 10.00% and Inflation at 15.76%.</i> )	<b>27.34%</b> (1.2128)
Composite Mark-Up (Right-of-Way): ( <i>Composed of: Scheduling Contingency at 55.00%; Administration / Court Costs at 60.00%; and Inflation Factor at 40.00 %.</i> )	<b>247.20%</b> (2.4720)

## **COST ESTIMATE SUMMARY AND COST HISTOGRAMS**

---

The VE team prepared a cost model for the projects as shown on the following page. The cost model is arranged in the Pareto Charting/Cost Histogram format to aid in identifying high cost areas and is based on Estimate Reports for Project Nos. MSL-0004-00(427), P. I. No. 0004427, MSL-0004-00(427), P. I. No. 0004427, and NHS-0001-00(917), P. I. 0001917 which were prepared by Carter & Burgess, Inc., The LPA Group, Inc., and Moreland Altobelli Associates, Inc., respectively. As can be expected, judgments at this stage of the study are based on experience and intuition rather than facts, which are not uncovered until well along in the analysis of function. As a result of these qualified hypotheses, there appears to be a potential for initial savings in the following areas:

For Lee Road/Sweetwater Road and CR 817/Lee Road Widening, Phase 1 and Phase 2:

- Asphalt Paving – Base
- Curb and Gutter
- Aggregate Base
- Earthwork
- Storm Drain Pipe

For I-20/Lee Road Intersection Reconstruction:

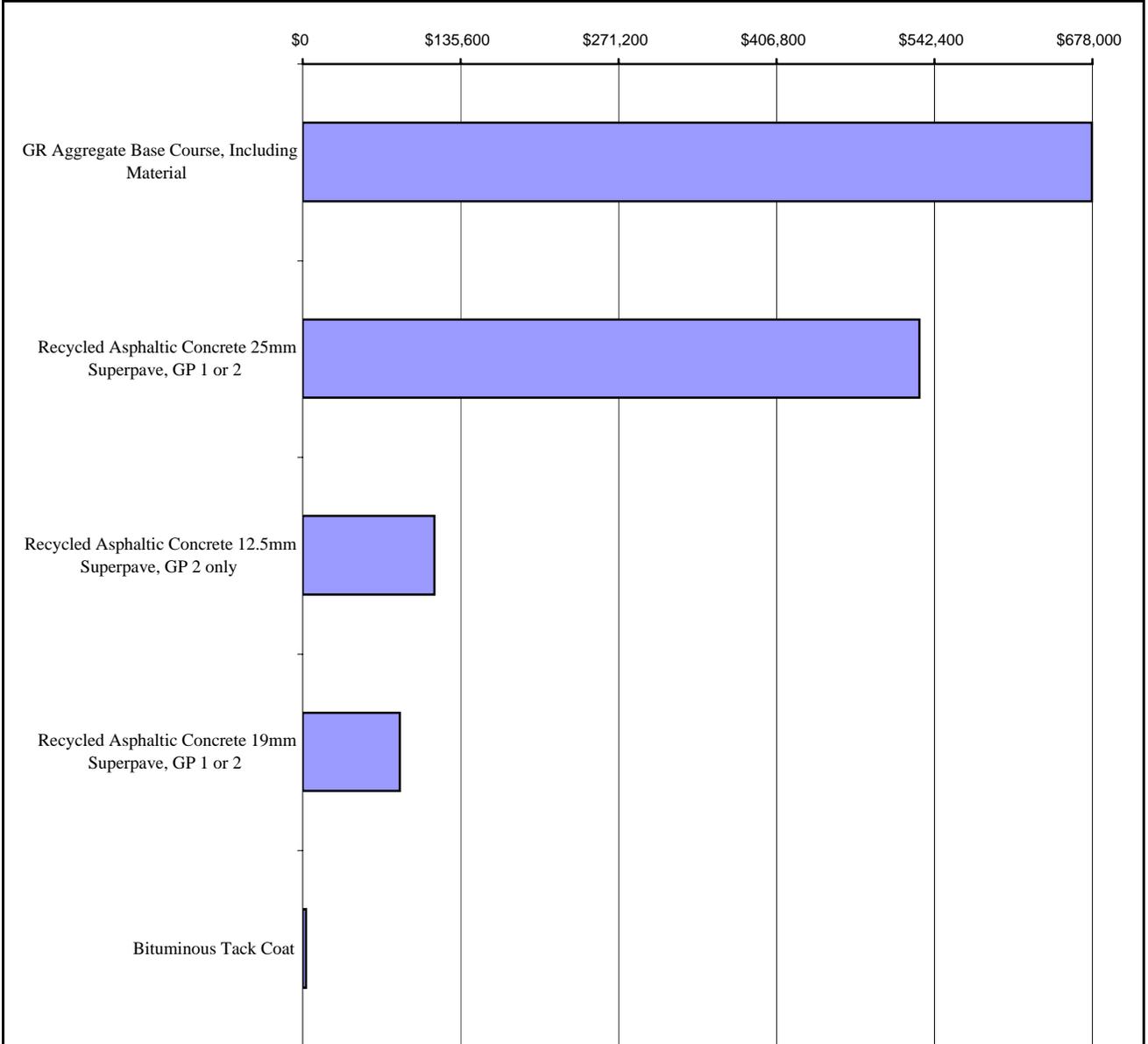
- Major Structures
- Grading and Drainage
- Base and Paving
- Traffic Control

# COST HISTOGRAM



Project: MSL-0004-00(427) **LEE / SWEETWATER ROADs WIDENING PHASE 1,**  
 MSL-0004-00(428) **CR 817 / LEE ROAD WIDENING PHASE 2,**  
 NHS-0001-00(917) **I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION**  
**Douglas County, Georgia Department of Transportation, District 7**  
*Preliminary Design Stage*

<b>TOTAL PROJECT - I-20 / Lee Road Interchange Reconstruction - Base and Paving</b>	COST	PERCENT	CUM. PERCENT
GR Aggregate Base Course, Including Material	677,440	48.19%	48.19%
Recycled Asphaltic Concrete 25mm Superpave, GP 1 or 2	529,350	37.66%	85.85%
Recycled Asphaltic Concrete 12.5mm Superpave, GP 2 only	112,875	8.03%	93.88%
Recycled Asphaltic Concrete 19mm Superpave, GP 1 or 2	83,250	5.92%	99.81%
Bituminous Tack Coat	2,738	0.19%	100.00%
<b>Construction Subtotal</b>	<b>\$ 1,405,653</b>	<b>100.00%</b>	
Engineering and Construction at	10.00%	\$ 140,565	
Inflation Based on 5.00% per annum for Three Years	15.76%	\$ 243,723	<b>Construction</b>
<b>Construction Total</b>	<b>\$ 1,789,941</b>	Mark-Up:	27.34%



Costs in graph are not marked-up.

## FUNCTION ANALYSIS

---

Function analysis was performed to: (1) define the requirements for each project element, and (2) to ensure a complete and thorough understanding by the VE team of the basic function(s) needed to attain a given requirement. Random Function Analysis worksheets for the project are attached. This part of the function analysis stimulated the VE team members to think in terms of the areas in which to channel their creative idea development.

Function Analysis is a means of evaluating a project to see if the expenditures actually perform the requirements of the project, or if there are disproportionate amounts of money spent on support functions. These elements add cost to the final product, but have a relatively low worth to the basic function.

In addition to the random function analysis, the VE Facilitator worked with members of the study team to develop a Function Analysis System Technique (F.A.S.T.) diagram for each phase. The F.A.S.T. diagrams were used to show the flow of function within the phases. It helps to confirm the project is addressing those issues that have been voiced by the owner as being important. The diagrams were generated by asking the key question: "What is the most important function to be accomplished by this phase?" The answer is characterized by a verb/noun pair. In turn, another question is asked: "Why?" The answer is again listed in a verb/noun pair, and the process continued from left to right. If the result is a true F.A.S.T. diagram, the flow of functions from right to left will answer the question "Why?" No F.A.S.T. diagram is ever completed. The readers of this report may wish to challenge themselves to see how far they can carry the construction of the F.A.S.T. diagram.

This F.A.S.T. diagram notes the critical function paths and identifies the projects' basic functions as **FACILITATE/NORTH-SOUTH TRAFFIC MOVEMENT** by **ALLEVIATING/CONGESTION** by **Increasing/Capacity, Improving/Current Alignment and Interchange and Intersection Geometry, and Correcting/Ramp Deficiencies**. The F.A.S.T. diagram is included at the end of this section of the report.



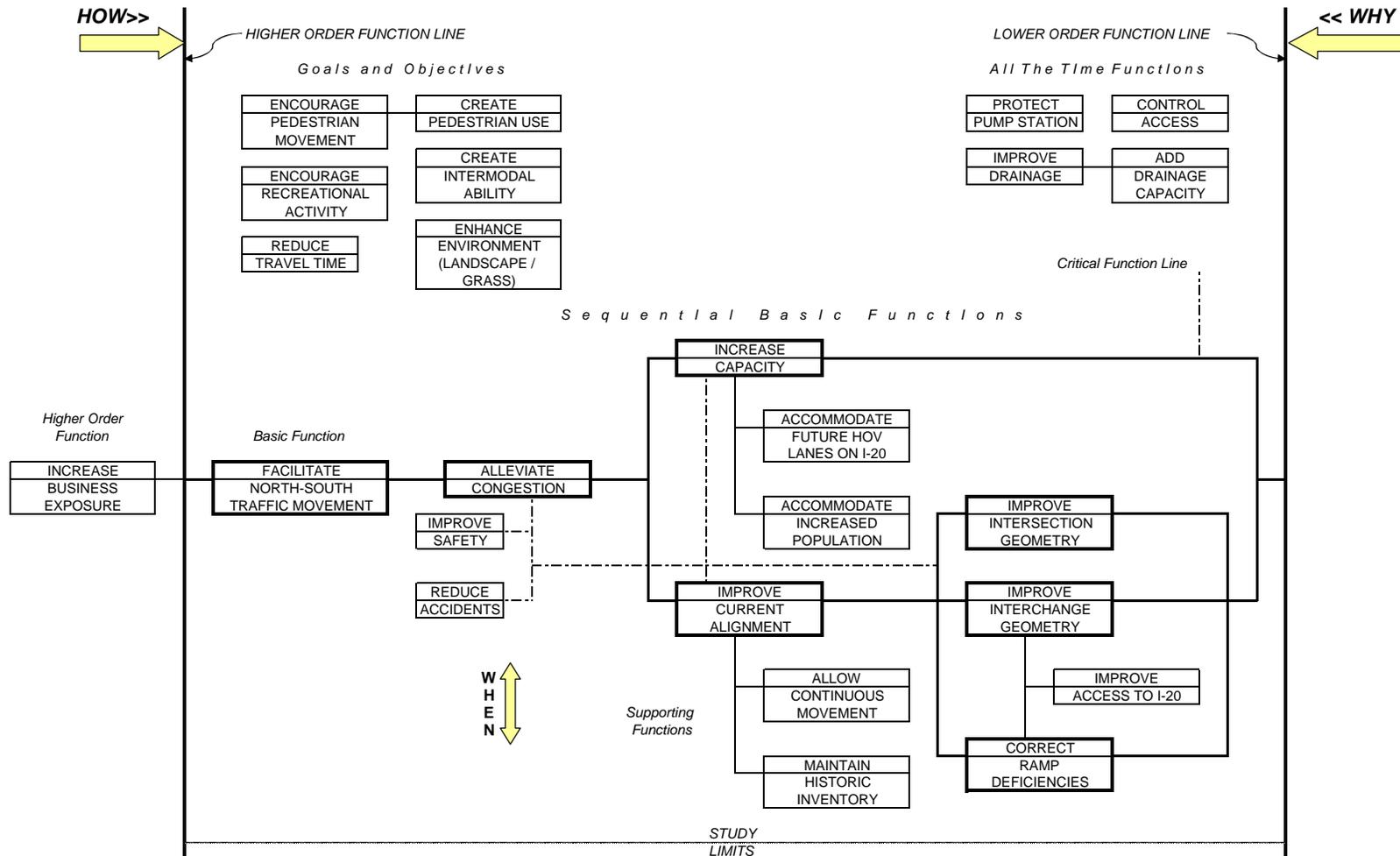




**MSL-0004-00(427) LEE / SWEETWATER ROADs WIDENING PHASE 1,  
MSL-0004-00(428) CR 817 / LEE ROAD WIDENING PHASE 2,  
NHS-0001-00(917) I-20 / LEE ROAD INTERCHANGE RECONSTRUCTION**

MSL-0004-00(427), P. I. No. 0004427; MSL-0004-00(428), P. I. No. 0004428;  
and NHS-0001-00(917), P. I. No. 0001917

Georgia Department of Transportation, District 7  
Douglas County, Georgia



## **CREATIVE IDEA LISTING AND JUDGMENT OF IDEAS**

---

During the creative phase, numerous ideas, alternative proposals and/or recommendations were generated using conventional brainstorming techniques as recorded on the following pages.

These ideas were then discussed and the advantages/disadvantages of each listed. The VE design team compared each of the ideas with the concept solution determining whether it improved value, was equal in value, or lessened the value of the solution.

The ideas were then ranked on a scale of 1 to 5 on how well the VE design team believed the idea met necessary criteria and program needs. The higher rated ideas were then developed into formal alternatives and included in the VE workshop. Some ideas were judged to have minimal cost impacts on the project but provided enhancements in the form of improved operations, efficiency, constructibility or potential to save unknown or hidden costs. These were given the designation "DS" which indicates a design suggestion. This designation is also used when an idea is difficult to price but improves the functionality of the project or system, and is deemed to be of significant value to the owner, user, operator or designer.

Typically, all ideas rate 4 or above are included in the Study Report. When this is not the case, an idea was combined with another related idea or discarded, as a result of additional research that indicated the concept as not being cost-effective or technically feasible.

All readers are encouraged to review the Creative Idea Listing and Evaluation worksheets since they may suggest additional ideas that can be applied to the design.

# CREATIVE IDEA LISTING



PROJECT: MSL-0004-00(427) **LEE/SWEETWATER ROADS WIDENING PHASE 1**,  
 MSL-0004-00(428) **CR 817/LEE ROAD WIDENING PHASE 2**,  
 NHS-0001-00(917) **I-20/LEE ROAD INTERCHANGE RECONSTRUCTION**  
**Douglas County, Georgia Department of Transportation, District 7**  
*Preliminary Design Stage*

SHEET NO.:  
1 of 2

NO.	IDEA DESCRIPTION	RATING
	<b>PHASE 1 (PH1) – Lee Road/Sweetwater Road Widening</b>	
PH1-1	Provide access to the new fire station at the intersection of Groovers Lake Road and Linda Drive	5
PH1-2	Cul-de-sac Linda Drive	4
PH1-3	Cul-de-sac Honeysuckle Lane	1
PH1-4	Eliminate multi-use path	2
PH1-5	Use a four-lane section throughout	2
PH1-6	Use a regular sidewalk in lieu of the multi-use path	4
PH1-7	Cul-de-sac Cooper Circle	4
PH1-8	Cul-de-sac Inman Street	4
PH1-9	Cul-de-sac Houston Street	4
PH1-10	Improve Junior High Drive and Skyview Drive intersection	3
PH1-11	Reconfigure through-flow intersection of Lee Road, Sweetwater Road, and Beechwood Drive	4
PH1-12	Use a three-lane section from Vulcan Drive to Skyview Drive	1
	<b>PHASE 2 (PH2) – CR 817/Lee Road/Widening</b>	
PH2-1	Eliminate multi-use path	2
PH2-2	Use a regular sidewalk in lieu of the multi-use path	4
PH2-3	Extend multi-use path to serve the Sweetwater Creek Recreational Area and State Park	4
PH2-4	Eliminate the new connection between Old Chestnut Log Road to Lee Road	4
PH2-5	Reconfigure the existing Old Chestnut Log Road/Lee Road intersection	2
PH2-6	Extend the school bus auxiliary lane to Sweetwater Elementary School along Lee Road	5
PH2-7	Reconfigure Chestnut Log Loop/Lee Road intersection	4
PH2-8	Signalize Chestnut Loops Log Loop/Lee Road intersection	2
PH2-9	Realign the driveway to the Marvelous Light Christian Ministries property	4
PH2-10	Cul-de-sac Maxwell Place and provide access on Old Lee Road	4

Rating: 1 → 2 = Not to be Developed; 3 – 4 = Varying Degree of Development Potential; 5 = Most Likely to be Developed;  
 ABD = Already Being Done; N/A = Not Applicable

